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TABLE OF CONTENTS.

Notes on Hippoboscidæ. *J. Bequaert*.....266
Habits of the Hibiscus Bee, *Emphor bombiformis*. *Charles Robertson*.....278
A New Genus of Sucking Lice. *Eric Mjöberg*.....283
A Specimen of *Melanoplus differentialis* Thomas with Four Ocelli. *Robert D. Glasgow*.....285
The Second Abdominal Pleurite in the Higher Coleoptera. *W. T. M. Forbes*.....291
Some Unusual and Interesting Butterflies from Eastern Massachusetts. *Austin H. Clark*.....293
Some Rarities from Essex County, Mass. *A. P. Morse*.....298
New Species of Diptera from North Carolina and Florida. *C. W. Johnson*...299
Some Myrmecophilous Phoridæ from the Neotropical Region. *Charles T. Brues*.....303
A Japanese Dohrniphora Bred from Dead Snails (Diptera: Phoridæ). *Charles T. Brues*.....313
Notes on the Ant Fauna of Oak Galls in the Woods Hole Region. *A. H. Sturtevant*.....313
The Relative Importance of Vision and the Chemical Sense in Anax Larvæ. *Cyril E. Abbott*.....315
Mantispa interrupta and *M. brunnea* in New England. *C. W. Johnson*.....318
Proceedings of the Cambridge Entomological Club.....319
Index.....323
Folder, Pictorial Key to Dragon-fly Larvæ. *R. H. Howe*.

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PSYCHE

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NOTES ON HIPPOBOSCIDÆ.

1. LYNCHIA WEYENBERGH AND LYNCHIA SPEISER ARE NOT CONGENERIC.

BY J. BEQUAERT,

Department of Tropical Medicine, Harvard Medical School.

While attempting to identify a hippoboscid obtained in Brazil, I was struck with the considerable disparity in size between *Lynchia penelopes* Weyenbergh, the type of the genus *Lynchia*, and the other species subsequently placed by Speiser in *Lynchia*. A closer study of the original description of *Lynchia* brought me to the conclusion that Weyenbergh's species does not fit the generic diagnosis of *Lynchia*, as drawn up by Speiser and accepted by subsequent investigators.

Briefly stated, Speiser's genus *Lynchia* is characterized in the first place by the absence of the anterior basal cross-vein (M_3) : "däs Geäder dadurch auffallend und charakteristisch, dass die hintere Basalzelle ganz offen ist, die hintere Querader total fehlt." Such is the case with *Olfersia maura* Bigot, *Olfersia lividicolor* Bigot, and other related species. But it is not true of *Lynchia penelopes*, which, according to Weyenbergh's description, has the second basal cell (M) closed by a cross-vein.

I subjoin a translation of Weyenbergh's original, since it is inaccessible to most students. In order to make the author's meaning quite clear, I have inserted in brackets the names of the veins as used by most modern writers and also the corresponding symbols in the Comstock-Needham system. For the latter, I have accepted Ferris and Cole's interpretation of the hippoboscid wing (1922, Parasitology, XIV, p. 195, fig. 12.)

Lynchia Weyenbergh

Lynchia Weyenbergh, 1881, Anales Soc. Cientif. Argentina, XI, p. 195 (monotypic for *Lynchia penelopes* Weyenbergh.)

"Antennæ gemmiformes elongatæ setosæ, lateribus hipostomatis insertæ. Ocelli nulli. Tarsi unguibus tridentatis. Alæ latæ incumbentes abdomine multo longiores, acuminatæ.

"This genus must be placed between *Ornithomyia and Olfersia.* Although the antennæ are bud-shaped, they are longer than in *Ornithomyia* and hairy, especially at the tips, and are inserted very low down. The two compound eyes are very globular and leave between them a wide front; but there are no ocelli, instead of which one finds on the spot where they usually occur a small triangular plate, of a dark color, and somewhat raised. This peculiarity, *viz.* the lack of ocelli, removes the genus from *Ornithomyia* and brings it near *Olfersia.* The tridentate claws, on the other hand, bring it nearer the former and remove it from the latter, which has bidentate claws [the claws are tridentate in *Olfersia* also.—J. B.] The wings are on the whole similar to those of *Ornithomyia* and *Olfersia,* but in the last-named genus they are much rounded off at the apex, and they are also quite obtuse in *Ornithomyia*; while in *Lynchia* they are much pointed, although being also very long. The head is flat, disciform, as in the genera mentioned, which it also resembles in the mode of articulation with the thorax and in general appearance. The mouth-parts are very short and completely hidden within the short sheath that envelops them. The line or transverse suture, which divides the thorax into two parts, is very distinct in this genus; but the longitudinal line, which in the other genera is furrow-like, is much raised in *Lynchia,* even forming a linear elevation. On the outer angle of the thorax one sees an ovate spiracle, with several stiff hairs on the anterior margin. The scutellum is very short and broad. The abdomen bears strong spines on the lateral margins of the segments, and long hairs at the apex. The legs are little hairy; one finds only a few stronger hairs about the claws. The veins of the wings are quite characteristic, although showing some similarity to those of *Ornithomyia*; but the difference is greater than the resemblance. Only three veins run from the articulation to the lower [posterior] margin of the wing. Furthermore, as in *Ornithomyia*, the system of wing veins is colored in dark in the portion of the wing toward the anterior border and the articulation, as if the hollow veins were filled there with dense matter; while over the remainder of the wing the veins are delicate and transparent. Meigen shows this quite well in his drawings of the genus *Ornithomyia* (Syst. Beschr., VI, Pl. 64.) In this connection there exists in *Lynchia* a peculiarity which has arrested my attention: *viz.* that the discoidal vein [fourth longitudinal; M_1+_2] is always interrupted by a clear and transparent portion, placed a short distance from the forking of the common posterior [sub-stem vein] into the discoidal [fourth longitudinal; M_1+_2] and the true posterior [fifth longitudinal; M_3+Cu_1]. At first sight one might believe that the vein is actually interrupted in this spot, but in focussing correctly one soon is convinced that the interruption is merely in the substance filling the vein and not in the vein itself. I had at first thought that this was an accidental abnormality, but it now appears to me to be a typical feature. The costal vein [first and second sections of costa] is very short, not extending over one third of the wing, where the subcostal [first longitudinal; R_1] unites with it and then forms about one third more of the anterior margin, extending as far as the point where the radial [second longitudinal; R_2+_3] unites with the subcostal. The mediastinal [auxiliary; Sc] almost touches the subcostal [first longitudinal; R_1] and consequently the space between both is very narrow. The transverso-basal [humeral cross-vein; h] is, however, not absent, but is placed in an outwardly oblique direction between the costal and the subcostal [first longitudinal; R_1], before the point where the subcostal gives origin to the mediastinal [auxiliary; Sc.] The first longitudinal [second longitudinal; R_2+_3] bifurcates into the radial [second longitudinal; R_2+_3] and the cubital [third longitudinal; R_4+_5] very close to its origin. The radial [second longitudinal; R_2+_3] runs toward the anterior border, where it continues some distance as if it were the continuation of the subcostal [third section of costa], and soon unites under an acute angle with the cubital [third longitudinal; R_4+_5], that is to say in the same anterior border;

this junction takes place at a point about two-thirds of the distance along the anterior border. The margin of the remainder of the wing carries no vein. The second longitudinal or common posterior [sub-stem vein] bifurcates almost immediately beyond its origin, the bifurcation resulting in the discoidal [fourth longitudinal; M_1+_2] and the true posterior [fifth longitudinal; M_3+Cu_1.] The first of these runs at first a little toward the hind margin, thence with a bend toward the fore margin, so that the first articular cell [first basal cell; R_2], lying between the cubital [third longitudinal; R_4+_5] and discoidal [fourth longitudinal; M_1+_2] and closed by the transverso-media [anterior cross-vein; r-m], is very angular in its outer portion. After being connected with the cubital [third longitudinal; R_4+_5], at a point about two-thirds along the cubital, by means of the transverso-media [anterior cross-vein; r-m] just mentioned, the discoidal [fourth longitudinal; M_1+_2] runs in a gradual curve toward the lower margin of the wing, where it ends in about the fourth of the lower margin. The other branch, the true posterior [fifth longitudinal; M_3+Cu_1] runs, also with a gentle curve, toward the same border, where it ends about the middle. The *transverso-discoidal* [anterior basal cross-vein; M_3] *unites it with the discoidal* [fourth longitudinal; M_1+_2] *at the point where that vein forms the above-mentioned bend, thus forming the discoidal cell* [second basal cell; M.] There are no transverso-posterior veins [posterior cross-vein; m and posterior basal cross-vein; Cu_2.] The anal vein [sixth longitudinal; An] has a double origin, runs with a strong curve to the hind margin of the wing, and ends at a point three-quarters of the way along the hind margin, as measured from the tip of the wing. The several veins which form together what we call the anterior system, are all crowded near the fore margin of the wing, and this is true also of the discoidal [fourth longitudinal; M_1+_2], so that the cells and spaces between the veins are very long and narrow. Only the three posterior and the axillary cells [R_5; M_2; Cu_1 +1st A; and 2d A] are large and wide. The crowding of the veins near the fore margin of the wing is also observed in *Ornithomyia*, though not as pronounced as in *Lynchia*, and consequently the cells mentioned above are not so much lengthened and not as narrow as in *Lynchia*. Another difference with *Ornithomyia* is the absence of the mediastinal [auxiliary; Sc] in that genus, where it is fused with the subcostal [first longitudinal; R_1] [This is an error, as the auxiliary vein is present in *Ornithomyia* also.—J. B.] The transverso-basal [humeral cross-vein; h] is more perpendicular in *Ornithomyia*. It appears that in that genus an incomplete vein starts from the point where the cubital [third longitudinal; R_4+_5] ends in the fore margin, and runs with a strong curve toward the tip of the wing, cutting off part of the first posterior cell [R_5], but incompletely, since, as I have said, this rudiment of vein does not reach the margin itself. It also seems that in *Ornithomyia* the fore margin is bordered by a vein to within a short distance from the tip, a feature not seen in *Lynchia* [Neither this nor the foregoing feature of the wing exist in *Ornithomyia*.—J. B.] In addition in *Ornithomyia* there is a first transverso-posterior vein, which is found at about the level of the transverso-discoidal [anterior basal cross-vein; M_3], of which it appears the continuation, forming with it a figure resembling S, and it is especially this feature which makes an important difference in that part of the wing, when the two genera are compared [In *Ornithomyia* the anterior cross-vein and the anterior basal cross-vein are close to each other, whereas in *Lynchia* they are far apart.—J. B.] In *Ornithomyia* there seems to be also a second transverso-posterior vein [posterior basal cross-vein; Cu_2], placed very near the articulation, between the anal [sixth longitudinal; An] and the posterior [fifth longitudinal; M_3+Cu_1], immediately beyond the bifurcation of the common posterior [sub-stem vein] into discoidal [fourth longitudinal; M_1+_2] and true posterior [Cu_2 is present in *Ornithomyia*, absent in *Lynchia*.—J. B.] As I have said before, these cross-veins are entirely lacking in *Lynchia*. Tarsi as elsewhere throughout the family; halteres as in *Ornithomyia*."

Weyenbergh adds that he uses Schiner's orismology of the wing venation, as set forth by van der Wulp (1871), and that the peculiarities of the wing of *Ornithomyia*, which he introduces for comparison, are taken from Meigen's drawing of that species. This explains some of the erroneous interpretations which I have pointed out. Weyenbergh failed to notice that the "first transverso-posterior vein,'' which he describes in *Ornithomyia*, is homologous with the "transverso-discoidal'' which he found in *Lynchia*, the second basal cell being merely much lengthened in *Ornithomyia*. Evidently this has been the source of Speiser's erroneous assumption that the second basal cell was not closed by a cross-vein in *Lynchia*.

From the above account it appears that *Lynchia* Weyenbergh is a synonym of either *Olfersia* Wiedemann (*Feronia* Leach; *Pseudolfersia* Coquillett) or *Ornithoponus* Aldrich (*Olfersia* of authors, not of Wiedemann.) Although the description is not very explicit with regard to the structure of the head, the statement that there is a small, triangular, somewhat raised plate in the ocellar region, can, in my opinion, only apply to a species of *Ornithoponus*. I believe that the name *Lynchia* will eventually be used instead of *Ornithoponus*. Since the problem will be fully solved only with the rediscovery of the type-species, I deem it worth while to give a translation of the specific description also.

Lynchia penelopes Weyenbergh, 1881, Anales Soc. Cientif. Argentina, XI, p. 199.

"L. sepia-obscura, oculis subfuscis margine orbitali piceo. Antennæ flavescentes extremo obscuro. Frons flavescens. Alæ hyalinæ. Femora anteriora aurata.

"The eyes are of a dark reddish brown color and an orbital, nearly black half-circle incloses them on the frontal portion. These eyes are large and spherical, and show punctiform facets. The antennæ and the front are yellowish and at the top of the occiput one sees a triangular, dark, somewhat raised plate. On the labrum one sees a dark spot. The tip of the first segment of the antennæ also is nearly black. The thorax is of a dark sepia color; the median, raised line is brownish black, and the whole shows a yellowish sheen, somewhat metallic, especially on the metathorax and along the margins of the scutellum, which latter bears hairs along its posterior border. The abdominal segments are of the same color, very dark; and their margins have a yellowish sheen on the articulations. The veins have the same general color, a little grayish, and the wings are very transparent and large. The halteres are dirty white. The claws of the legs are black and the tarsal segments dark brown, a little paler in the middle. The femora are flat, yellowish, with the upper margin nearly black, while the flattened sides are yellowish; the tibiæ of the hind legs are entirely dark or dark brown. The femora of the fore legs are golden yellow on the ventral surface. The articulations of the legs are all dark. The ventral surface of the insect is also very shiny and of a dark sepia, metallic color. The labium is pale brown and the genitalia are yellowish. The venter is finely granulose or shagreened a character which is especially evident in the female. The interruption of the discoidal vein [fourth longitudinal; M_1+_2], which I have mentioned before in the generic description, is perhaps but a specific character; yet this peculiarity seems to me to be constant. Spread of the wings, from the tip of one to that of the other, 2.5 cm. Length (including the head, but not the wings), of female, 1 cm.; of male, 8 mm."

Off "Pavo del monte, Yacú, or Charate," *Penelope canicollis* Wagler, in the Province of Tucuman, Argentina.

This is evidently one of the largest species of the genus and as such must be related to *Ornithoponus obliquinervis* (Rondani), of Mexico, and *O. rufiventris* (Bigot), of Brazil.

Pseudolynchia, new name.

Lynchia Speiser, 1902, Zeitschr. Syst. Hym. Dipt., II, p. 155. Massonat, 1909, Ann. Université Lyon, N. S., I, Sci., Fasc. 28, p. 295. Aldrich, 1923, Insecutor Inscitiæ Menstr., XI, p. 77. Ferris, 1925, Philippine Jl. Sci., XXVII, p. 415 (Not of Weyenbergh, 1881.)

Type by present designation: *Olfersia maura* Bigot, 1885.

The generic characters have been correctly given by Speiser, Massonat, Aldrich, and Ferris, so there is no need repeating them here. Of the described hippoboscids, the following appear to belong to *Pseudolynchia.*

1. **Pseudolynchia brunnea** (Latreille.)

Ornithomyia brunnea Latreille, 1811, in Olivier, Encyclop. Méthod., Insectes, VIII, p. 544 (Carolina; no host.)

I refer to *P. brunnea* eight specimens from the following localities:

Alamogordo, New Mexico, three females, without host, May 8, 1902. Academy of Natural Sciences, Philadelphia.

Wareham, Massachusetts, two females, off adult male whippoorwill, *Antrostomus vociferus* Wilson, June 6, 1901 (O. Bangs Coll.) Museum of Comparative Zoology, Cambridge.

Hot Springs, Virginia, three females, off whippoorwill, *Antrostomus vociferus* Wilson, July, 1897 (Wirt Robinson Coll.) Museum of Comparative Zoology, Cambridge.

I believe that this species has not been properly recognized thus far. Speiser does not appear to have known it. Coquillett determined as *brunnea* specimens which were sent to him from Ceará, Brazil (see F. Dias da Rocha, 1908, Bol. Museu Rocha, Ceará, I, p. 77), but these Brazilian specimens were *P. maura* var. *lividicolor* (Bigot.)

Although closely allied to *P. maura* (Bigot), *P. brunnea* is undoubtedly a distinct species. It is of a very dark brown color, often nearly black. It differs from both *P. maura* and the variety *lividicolor* in its robust build, in the much shorter and broader wings, which are 5 to 5.5 mm. long and 1.8 mm. wide, and in the shape of the head, the front being distinctly longer. The eyes extend farther toward the occiput, their upper margins reaching much beyond the anterior margin of the smooth vertex. The frontal lunule is relatively short; the basal, undivided portion of the clypeus is rather narrow, but long, the apical, diverging arms being not much over twice as long as the basal portion. The dorsum of the thorax is somewhat less hairy than in *P. maura*. The entire anal cell [Cu+1st A] is covered with microscopic setulæ, the axillary cell [2d A] being the only bare part of the wing membrane.

The specific name has usually been credited to Olivier, but the article "Ornithomyie" of the Encyclopédie Méthodique was written by Latreille and is signed "(Lat.)"

2. **Pseudolynchia capensis** (Bigot.)

Olfersia capensis Bigot, 1885, Ann. Soc. Ent. France, (6) V, p. 240 (♂; Cape of Good Hope; no host.)

Speiser (1902, Zeitschr. Syst. Hym. Dipt., II, p. 166), who examined Bigot's type, has given a few additional details regarding the coloration of this species, but its structural characters are not known.

I am inclined to believe that all later records of *capensis* from Somaliland, Natal, and the Canary Islands, really refer to *P. maura*.

3. **Pseudolynchia exornata** (Speiser.)

Olfersia exornata Speiser, 1900, Ann. Mus. Civ. Genova, XL, p. 562 (Doloc Tolong, western Sumatra; no host.)

This species is extremely close to *P. maura*, if at all distinct. Speiser (1902, Zeitschr. Syst. Hym. Dipt., II, p. 163) states that *maura* differs from *exornata* "durch ein dunkler braune Farbe der Stirn und ganz wesentlich geringere Beborstung des Kopfes."

Speiser has also recorded *exornata* from the Oasis Merv, in Russian Transcaspia, and from the River Luazomela, Kenya Colony; but in both cases the specimens were probably *P. maura*.

4. **Pseudolynchia garzettae** (Rondani.)

Olfersia garzettæ Rondani, 1879, Bull. Soc. Ent. Italiana, XI, 1879, p. 23 (Insubria, Italy; no host.)

This species has not been properly recognized. Speiser has referred to it a specimen from Bavaria, but gave no details as to how to separate it from its allies.

5. **Pseudolynchia maura** (Bigot.)

Olfersia maura Bigot, 1885, Ann. Soc. Ent. France, (6) V, p. 237 (Algeria; no host.)

This is the common parasite of the domestic pigeon in the tropical and subtropical parts of the Old World: Mediterranean Region, Asia Minor, India, Mauritius, Africa (from Algeria to the Cape), Philippine Islands, and Hawaiian Islands. I have seen two specimens (♀ ♂) from Asmara, Eritrea, kindly sent by Prof. Bezzi.

From *P. brunnea*, *P. maura* differs in the much longer wings, which are 6.5 to 7.5 mm. long and 2 to 2.4 mm. wide; the front is distinctly shorter, the space between the inner orbits nearly as broad as long, the upper margins of the eyes reaching hardly beyond the anterior margin of the smooth vertex; the frontal lunule is long; the basal, undivided portion of the clypeus is rather broad, but very short, dividing almost at once into the very long, diverging arms; the anal cell [Cu+1st A] is covered with setulæ over the anterior half only, the remainder of the cell, as well as the axillary cell, being bare. I have selected *P. maura* (Bigot) as the type of the genus *Pseudolynchia*, because it is not only widely distributed, but also one of the few species that may be recognized without hesitation. Excellent drawings of *P. maura* have been recently published by Ferris (1925, Philippine Jl. Sci., XXVII, pp. 416-417, figs. 2 and 3.) The short, stout, black setæ on the plantar surface of the middle basitarsus, mentioned by Ferris, are apparently a sexual character. I find them in all my male specimens, also of the var. *lividicolor*; in the female they are replaced by small, slender setæ.

5*a*. **P. maura** var. **lividicolor** (Bigot.)

Olfersia lividicolor Bigot, 1885, Ann. Soc. Ent. France, (6) V, p. 238 (Brazil; no host.)

This is the common parasite of domestic pigeons in South and Central America and the West Indies. I have seen it from the following localities:

Cuba, one male, without host (Poey Coll.) Museum of Comparative Zoology, Cambridge.

Barbados, one male, without host, October 16, 1904 (G. S. Evelyn Coll.) Academy of Natural Sciences, Philadelphia.

Puerto Arturo near Tela, Honduras, four specimens (♀ ♂), off domestic pigeons (F. M. Root Coll.) These specimens have been recorded as *Lynchia maura* by Dr. Root (1925, 13th Ann. Rept. United Fruit Co. Med. Dept., (1924), p. 209.)

Manáos, Brazil, one female taken in flight, at the hotel, September 14, 1924 (J. Bequaert Coll.)

After carefully comparing these American specimens with the Old World *P. maura*, I am unable to find any structural differences. Since, however, they are distinctly paler than the typical *P. maura*, I regard *lividicolor* as the Neotropical variety of that species. Bezzi (1909, Broteria, Ser. Zool., VIII, 2, p. 64) and Austen (1921, Bull. Ent. Research, XII, p. 122) regard the South American form as identical with *P. maura*.

6. **Pseudolynchia rufipes** (Macquart.)

Olfersia rufipes Macquart, 1848, Dipt. Exot., Suppl. III, p. 69 (Reunion; no host.)

The species has not been properly recognized.

7. **Pseudolynchia simillima** (Speiser.)

Lynchia simillima Speiser, 1904, Ann. Mus. Civ. Genova, XLI, p. 337 (Java; no host.)

This was based upon a specimen recorded as "*Olfersia spinifera*" by van der Wulp (1880, Tijdschr. v. Entom., XXIII, p. 193.) Speiser's description mentions no structural characters to separate it from the allied species.

Of the seven species listed above, only two have been sufficiently characterized thus far. Probably several of the others are mere synonyms.

Lynchia pusilla Speiser (1902, Zeitschr. Syst. Hym. Dipt., II, p. 157; Cuba) is the type of the genus *Microlynchia*, which differs from *Pseudolynchia* in the presence of minute ocelli and a differently shaped scutellum. I also regard *Olfersia falcinelli* Rondani (1879, Bull. Soc. Entom. Italiana, XI, p. 23; Malta) as a *Microlynchia*. The size is that of *M. pusilla* and the shape of the scutellum is the same. The ocelli were probably overlooked owing to their small size.

ADDENDA.

After the present paper was sent to the printer, I had occasion to examine many additional specimens of *Pseudolynchia*, from various sources. Since I was, nevertheless, unable to distinguish more than the two species recognized above, I am more than ever inclined to doubt the distinctness of some of the others. Some readjustment of names will eventually be necessary.

1. **Pseudolynchia brunnea** (Latreille.)

Specimens at the United States National Museum:

Ames, Iowa, without host; two specimens, which F. Knab (1916, Insecutor Inscitiæ Menstr., IV, p. 3) referred to *P. maura.*

St. Vincent Island, Florida, off *Antrostomus carolinensis* (Gmelin) (W. L. McAtee Coll.)

Princeton, Florida, off *Antrostomus vociferus* (Wilson) (W. Byrd Coll.)

Barro Colorado, Gatun Lake, Panama, off a nighthawk, *Chordeiles acutipennis* (Boddaert), September 24, 1923 (R. C. Shannon Coll.)

Specimens at the American Museum of Natural History:

Sherborn, Massachusetts, off *Antrostomus vociferus* (Wilson) (C. W. Johnson Coll.)

St. Augustine, Florida, off chuck-will's-widow, *Antrostomus carolinensis* (Gmelin) (C. W. Johnson Coll.)

Specimens received from the Entomological Branch of the Department of Agriculture of Canada (through Mr. C. H. Curran):

Low Bush, Lake Abitibi, Ontario, off a nighthawk, *Chordeiles virginianus* (Gmelin), four specimens (N. K. Bigelow Coll.)

2. **Pseudolynchia maura** (Bigot.)

A study of an extensive series from all parts of the world has now convinced me of the utter futility of separating *lividicolor* from *maura*, even as a variety. One finds all transitions between pale-colored and dark specimens. Moreover, I am inclined to believe that *P. maura* was originally an Old World insect, which was introduced by man into the Americas, together with the domestic pigeon.

Unless otherwise stated, the host of the specimens recorded below is in each case the domestic pigeon.

Specimens at the United States National Museum.

Palermo, Sicily.

Asmara, Eritrea.

Umbeluzi, Lourenzo Marques, Portuguese East Africa, off "*Strix flammea*" (C. W. Howard Coll.) This specimen was identified as "*L. rufipes*" in the collection, but I was unable to find that it differed structurally from *P. maura*.

Oahu, Hawaiian Territory (J. F. Illingworth Coll.)

Kawailoa, Oahu, H. T. (H. T. Osborn Coll.)

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Campinas, Brazil (A. Hempel Coll.)

São Paulo, Brazil (Ad. Lutz Coll.)

Some of these localities have been reported by F. Knab (1916, Insecutor Inscitiæ Menstr., IV, pp. 3-4.)

Specimens at the Bureau of Animal Industry, U. S. Department of Agriculture:

Montgomery, Alabama (M. J. Myers Coll.)

Meridian, Mississippi.

HABITS OF THE HIBISCUS BEE, *EMPHOR BOMBIFORMIS*

By Charles Robertson,

Carlinville, Illinois.

The following paragraphs have been overlooked in the bibliography of this bee, and by authors who have made observations upon it. The passages have been shortened a little by leaving out some irrevelant words.

1. 205.—"*Emphor bombiformis* is by far the most abundant visitor (of *Hibiscus lasiocarpus*). Indeed, in two seasons' collecting of insects on flowers, I have failed to find this bee except on this plant. The female visits the flower for honey and *pollen, her loose scopa being well adapted to hold the large grains.* The male comes for honey *and in search of the female.* In sucking, this bee generally begins with 4 (the middle nectary on the right) and turns to the left, often missing 5, but sometimes reversing, so as to empty all. Of 27 individuals, only 10 sucked 5 nectaries, 17 missing one or more. The 27 sucked 113 out of a possible 135, and missed 22."

2.—"Mr. Charles Robertson, of Carlinville, Ill., read a most interesting note upon the habits of the bee *Emphor bombiformis.* This bee, it was started, confines itself almost exclusively to *Hibiscus,* chiefly *H. lasiocarpus.* It was stated that in collecting these bees it is important to catch *those flying around the plant without alighting, as these were generally the males,* whilst those visiting the flowers for honey and *pollen* were the females. On August 5th, when walking along a dam with water on one side, he had noticed a female standing upon the water; she then flew to a bank, and he observed that she was *carrying water* to facilitate the excavation of hard ground, into which she was burrowing to build her nest. Sometimes one pellet of earth would be taken out after such an application of water, but at others three or even four. An interesting discussion followed which was participated in by Messrs. Osborn, Cook, Weed, Fletcher and others." Published in 1890 (**2**) and cited in 1918 (**9**), this was overlooked y two bibliographies (**11** and **14**).

4, 31-2.—"As a *typical case of an oligotropic bee, Emphor bombiformis* may be mentioned. Both sexes occur in abundance on flowers of *Hibiscus lasiocarpus*, the female collecting the *pollen*, the males often spending the night in the flowers. *The bees do not occur except when the Hibiscus is in bloom.* Within several yards of the *Hibiscus* I have seen the female making nests in a dry bank, *carrying water* to soften the earth she was excavating. *The bees coming out next year find the Hibiscus in bloom near by.* The only visits to other flowers I have seen the bees make were to those in the neighborhood of the *Hibiscus*. Thus I have seen a single female sucking the nectar of *Cephalanthus occidentalis*, and another that of *Vernonia fasciculata*, as well as a single male sucking nectar of *Ipomoea pandurata*. The outside visits in no way modify the essential relation of the bee to the *Hibiscus*."

9.—"The fact that *Emphor bombiformis* rests upon the water when drinking, mentioned under the above title by Frederick Knab (**7**) was observed in 1890 and was recorded in **2**. It is fairly certain that the bees were not drinking in the ordinary sense, but that they consisted exclusively of females which were getting water to soften the earth in which they were making excavations for their nests."

This passage is casually cited (**11**:588) under Knab, as if it related to "drinking" instead of *carrying water*, and in spite of the fact that Knab's observation was not new.

PHENOLOGY.—*Hibiscus lasiocarpus* blooms 59 days, July 20-Sept. 16. *Emphor bombiformis*, its oligolege, flies 53 days, July 21-Sept. 11, the male 44 days, July 21-Sept. 2, the female also 44 days, July 30-Sept. 11. The male is 9 days earlier than the female, which is about the average for males, 9.6 mentioned in **10**. The female is 9 days later than the male, which is 13 less than the average for females given in **10**. This is one of 5 long-tongued bees in **10**, 341. Grossbeck and Nichols give Aug. 22, 25 and Sept. 3.

FLOWER VISITS (7).—♀ c(2)—MALVACEAE: Hibiscus lasiocarpus, H. militaris.

♀s(3)—Compositae: Vernonia fasciculata; Convolvulaceae: Ipomœa pandurata; Rubiaceae: Cephalanthus occidentalis.

♂s(5)—Compositae: Cirsium lanceolatum; Convolvulaceae: *Ipomoea pandurata*; Malvaceae: *Hibiscus lasiocarpus, H. militaris*; Verbenaceae: Verbena stricta. Flowers also visited by the female are in italics. Of the general visits, 57.1 per cent fall under Mas, Hb and red (=red, purple etc.).

In my lists of visitors to local flowers I have distinguished the visits of the males and females and noted the pollen visits of the females. These are ignored and mixed with notes where the distinctions were not made. In **12,** 149, it is stated that visits of nest-making bees should show the pollen visits of the female, the nectar visits of the female and the nectar visits of the male. This was carried out in **13.** The female of *Calliopsis andreniformis* shows 33.3 per cent under Mas and 52.3 under red, while the male shows 27.5 under Mas and 48.2 under white. The pollen visits of the female show 48.7 under Mas and 47.3 under red, while the nectar visits show 30.4 under Mas and 56.5 under red. In **15,** 82 it is shown that oligolectic bees exhibit remarkable differences in their pollen and nectar visits. At *Hibiscus lasiocarpus*, at *Ipomoea pandurata* and at *Verbena stricta* mean three different things. Probably most people would not regard the distinctions as important. Many people, however, think science and the applications of science are the same thing and that there is no conflict between science and 1000 conflicting religions. In references to my papers "*Hibiscus*" means *H. lasiocarpus*. The bee never occurs on *H. trionum*.

E. fuscojubatus (8) was based on comparison of three females from New Jersey with one of *E. bombiformis* from Georgia. Local specimens show that differences like those credited to these species are not constant are not correlated. Any repectable local collection is likely to discredit the validity of *E. fuscojubatus*. Twenty-two local females and 12 males vary as follows: mesonotum pale 22, 12; scutel ochraceous 18, 0; vertex rufofuscous 12, 6; vertex ochraceous 3, 3; front rufofuscous 6, 3; front ochraceous 6, 4; cubital cell 3 longer than second 7, 5. The hair of vertex varies from nearly black through ochraceous to quite pale. How can one tell that the characters of *E. bombiformis* are shown by one specimen or that Grossbeck's observations were on *E. fuscojubatus*?

Historically the relations of flowers and insects was a botanical subject as shown by the works of Sprengel, Darwin, Delpino, Mueller, Mac Leod and others. Most of the papers and abstracts are in botanical journals, a fact which indicates the place to look for the literature.

Dependence of *E. bombiformis* on pollen of *H. lasiocarpus*, and adaptation of scopa to large pollen grains was recorded in **1**, 1888 (see also **2** and **4**); habit of male of flying about flowers in search of the female, in **1**, 1888, and **2**, 1890; female carrying water to soften ground, in **2**, 1890 (also in **4** and **9**); phenological correlation with *H. lasiocarpus* and habit of nesting near it, in **4**, 1899.

Chronological Bibliography.

1. 1888. Robertson, C. Zygomorphy and its causes. I-III. Bot. Gaz. **13**: 146-51, 203-8, 224-30.

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3. 1893. *Hibiscus lasiocarpus*. Flowers and insects. XI. Bot. Gaz. **18**: 270-1.

4. 1899. On the flower visits of oligotropic bees. Flowers and insects. XIX. Bot. Gaz. **28**: 27-38.

5. 1905. Knuth, P. Handbuch der Blütenbiologie. 3^2: 417.

6. 1911. Grossbeck, J. A. A contribution toward the life history of *Emphor bombiformis*. Journ. New York Ent. Soc. **10**: 238-43.

7. 1911. Knab, F. How Emphor drinks. Proc. Ent. Soc. Wash. **13**: 170.

8. 1913. Nichols, M. L. Some observations on the nesting habits of the mining bee, *Emphor fuscojubatus*. Psyche **20**: 107-12.

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11. 1920. Lutz, F. E. and Cockerell, T. D. A. Distribution and bibliography of N. A. Apidæ etc. Bull. Am. Mus. Nat. Hist. **42**: 490-641.

12. 1922. Robertson, C. Data of anthecology. Flowers and insects. XXI. Bot. Gaz. **73**: 149-52.

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A NEW GENUS OF SUCKING LICE,

By Eric Mjöberg

Hamophthirius n. g.

Antennæ three-jointed, first joint very strongly developed, with a large chitinous hook; head anteriorly very strongly constricted, with a strong and sharp chitinous hook on each side, posterior half transverse, nearly twice as broad, posterior angles protruding, forming two processes, posterior margin strongly emarginate on each side of the middle; thoracic segments coalescent, parallel-sided, all pairs of legs fairly equally developed; abdomen of normal type, with pleural scelerites developed on segments two to six. Integument scaly.

Type, the following species:

Hamophthirius galeopitheci n. sp. (Fig. 1.)

Yellowish, depressed; head in front strongly chitinized; lateral hooks parallel, very sharp; antennæ with the first joint enormously developed, with a very large hook and ventrall yon the posterior margin with a smaller one; second joint shorter than the third, both nearly parallel-sided; third joint with two lateral sensitive fossæ, its terminal field with eight to ten sensitive seta-like organs. On the ventral side of the head posteriorly there is a dagger-like spine at each side; posterior lower angles obtuse, the upper angles distinctly produced, rounded at the tips, and provided with three long setæ. Thoracic segments coalescent, anterior angles of prothorax rounded; at the middle of the anterior margin deeply excised to receive the corresponding protruding part of the occipital region of the head; legs moderate in size, fairly equally strongly developed; tibiæ with four small terminal chitinous spines opposite to the claw; claws large, distinctly striated (fig. 1, b). Abdomen in both sexes of normal development; pleural scelerites small, posteriorly emarginate (fig. 1, c and d); tergites and sternites with two more or less regular rows of fine depressed setæ. Chitinous parts of genitalia in ♂ (fig. 1, e) forming two parallel jointed rods, simple gonapods of normal type, forming two flat lobes of more or less triangular shape and provided with numerous chitinous setæ; last segment produced into two small, unjointed processes.

Length of body: ♂1.7 mm; ♀2.5 mm. (Fig. 1, f).

Eggs: Oval, whitish, with a series of faint transverse ridges on the upper half, the top set off as a distinct micropyle field with numerous small protruding tubercules in a row.

This remarkable form of louse which offers in its external general appearance a striking resemblance to the mallophagan genus Trichophilopterus Stobbe in possessing strong chitinous hooks on the head and antennæ, was taken by me near Fesseltan in British North Borneo on a freshly shot Galeopithecus sp. Like its host it occupies a very isolated position and it is difficult to place it even in one of the known families. The mouthparts are very delicate but mainly of the same type as in other Anoplura. The three-jointed antennæ and the strongly developed chitinous hooks as well as the general shape of the head point to a high degree of specialization.

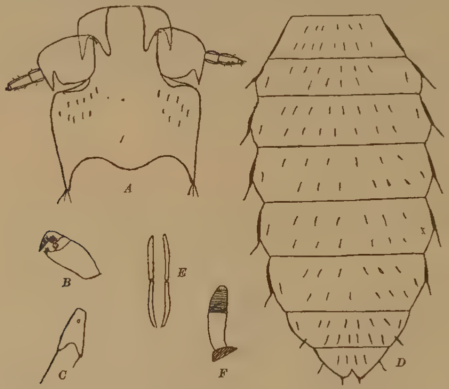

Fig. 1. *Hamophthirius galeopitheci* n. sp. A, head; B, tarsal claw; C, pleural sclerite; D, abdomen; E, genital rods of male; F, egg.

A SPECIMEN OF *MELANOPLUS DIFFERENTIALIS* THOMAS WITH FOUR OCELLI[1]

ROBERT D. GLASGOW

University of Illinois.

For some reason contributions to the literature of teratology from insect examples have been made in far greater numbers by European entomologists than by their American colleagues, yet there seems to be no apparent reason why abnormalities should be proportionately rarer among American insects or in the materials handled by American students of entomology. The writer has himself encountered no less than six interesting examples of arthropodan malformations in the course of his work, and every entomologist who has examined carefully any considerable amount of insect material must have observed some specimens which presented noteworthy abnormalities that should be recorded in the literature of biology, and thus made available for consideration by investigators who may have a special interest in these phenomena.

From the nature of these phenomena the occurrence of examples must be sporadic, and since each case standing alone may seem to the observer to have little signficance, they are likely to be unheeded, or at least unrecorded, and consequently lost to science. It is probable also that many examples of insect abnomalities have never been reported because the observers have hesitated simply to describe them without comment, and have not felt prepared to supplement their presentation with a plausible explanation or interpretation.

Not only is an interpretation not necessary in reporting examples of such malformations of insects, or of other organisms, but indeed any attempt to formulate an interpretation of such phenomena is scarcely warranted, unless the observer has studied a considerable body of data accumulated from many similar or related cases. It is sufficient simply to place each example on record as it comes to the attention of the observer, by publishing a good description, accompanied by a figure if possible, and by stating where the specimen has been deposited. It may well be considered a duty to do this much, since it must be largely from such reports of sporadic cases that data and materials may be assembled for consideration by those who may wish to make intensive studies of teratology to supplement experimental data to which it may be pertinent. Moreover, every case of insect abnormality should be reported however commonly the particular type of malformation may have been reported before; for the multiplication of examples of any one type of variation may well be as important as reporting unique examples of entirely new types.

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[1] Contribution from the Entomological Laboratories of the University of Illinois, Number 92.

(Read at the Cincinnati meeting of the Entomological Society of America, December 27, 1924.)

Among the various examples of insect malformation encountered by the writer, one of the most interesting is a specimen of the common short-horned grasshopper, *Melanoplus differentialis*. This specimen, which seems to be normal in every other respect, has four ocelli instead of the three which are normal for this species. In this specimen the lateral ocelli are normal in position, in form, and in size. The median ocellus, however, is represented by two perfectly formed ocelli which are disposed symmetrically, one on each side of, and laterad from the point where the normal median ocellus should be, and separated from each other by a distance somewhat greater than the diameter of a normal median ocellus.

Each of these para-median ocelli presents the characteristic oval form of a normal ocellus, each has a characteristically distinct, convex cornea, and each is situated in a separate characteristically oval depression in the front; but these aberrant ocelli are somewhat smaller than normal, so that the two ocelli together would present an aggregate area but little if at all greater than the area of a normal median ocellus.

The individual presenting this abnormality was found[2] in a lot of several hundred specimens which had been preserved for the study of external anatomy, and which were of uncertain origin. Because of the lack of suitable preservation, no attempt was made to study the structure of the median ocellar nerve. Instead, the specimen was preserved intact, and will be placed in the type series of the insect collections at the University of Illinois, where it can be studied further by anyone to whose work such a study may be relevant.

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[2] The attention of the writer was first directed to the anomalous condition of the ocelli in this specimen by a student in the introductory course in general entomology, Miss Margaret Windsor, who protested that the specimen given her for study did not agree with the specifications in the laboratory outline.

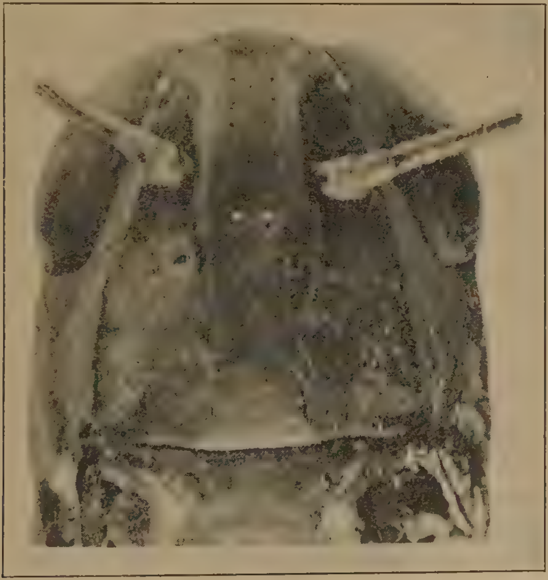

Fig. 1. *Melanoplus differentialis* with four ocelli, anterior view of head.

This particular malformation appears to be exceedingly rare among insects. The only other examples known to the writer are a specimen of the common meadow grasshopper, *Melanoplus femur-rubrum* Riley, described by M. W. Blackman,[3] and a specimen of a saw-fly, *Tenthredella simirubra* Norton, described by M. T. Smulyan.[4] In Blackman's specimen the median ocellus was replaced by a second pair of ocelli in a manner almost identical with the example here reported.

[3] Blackman, M. W., Psyche, v. 19, 1912, pp. 92-96, 1 fig.
[4] Smulyan, M. T., Proc. Bost. Soc. Nat. Hist., v. 36, 1923, p. 401.

The first hypothesis to suggest itself, and one that has already been advanced to explain this type of malformation, is that it may have a phylogenetic significance, and may constitute a reversion to an ancestral condition.

Examining the plausibility of this hypothesis, we find that Patten[5] has shown in a late larval or prepupal stage of a wasp, that the median ocellus first appears as a pair of separate pits or vescicles, which later unite to form a single ocellus on the median line. Packard[6] has stated that in the pupa of a bumble bee the median ocellus presents a "double shape, being broad, transversely ovate, and not round like the two others, as if resulting from the fusion of what were originally two distinct ocelli."

Leydig,[7] Rabl-Rueckhard,[8] Carriere,[9] Viallanes,[10] Janet,[11] and others have shown that in certain adult Hymenoptera the median ocellar nerve is double throughout some part of its length, while Burgess[12] in his figure of the brain of the Rocky Mountain Locust shows the median ocellar nerve to be unpaired in that species; still, in common with all structures located on the middle line of an organism having bilateral symmetry, where in early segmentation stages the plane of one of the cleavages corresponds to the future middle line, the median ocellus must in all groups of insects have been double at some point in the course of its development in the individual, and the condition of this structure in the Hymenoptera might seem to indicate that its origin from the fusion of an ancestral pair of ocelli may have occurred at no very remote period in the phylogeny of the class.

Indeed, the hypothesis begins to look delightfully plausible when only the supporting evidence is considered, but on the other hand it is well known that organisms tend to vary in all directions from the type. In organisms having bilateral symmetry where either paired structures, or the two halves of unpaired structures standing on the middle line, are geometrically related to each other as optical images with reference to the meson or axis of major symmetry, meristic variation in such a bilateral series may take either one of two directions. Bilaterally paired structures may be placed farther apart, or they may be brought closer together; and in the latter direction the degree of variation may extend to their becoming united to form a single median structure or even to their complete suppression. Normally unpaired, median structures may on the one hand be divided into two, so as to form a pair of bilaterally symmetrical structures, while on the other hand they may be reduced in size or entirely lost.

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[5] Patten, W., Journal of Morphology, Boston, v. 1, 1887, pp. 193-226.

[6] Packard, A. S., Text Book of Entomology, 1898, p. 250.

[7] Leydig, F., Tafeln zur vergleichenden Anatomie, Tubingen, 1864, Figs. 3-4.

[8] Rabl-Rueckhard, Archiv. f. Anat., Physiol., und Wiss-Medicin, 1875, pp. 480-499, pl. XIV.

[9] Carriere, J., Die Sehorgane der Thiere, Muenchen und Leipzig, 1885.

[10] Viallanes, H., Ann. Sci. Nat. Zool. 1887, 7 Ser. II, pp. 5-100, 6 plates.

[11] Janet, Chas., Anatomie de la Tête du *Lasius niger*, Limoges, 1905, 40 pages, 5 plates.

[12] Burgess, E., 2nd Report, U. S. Ent. Comm., 1880, pp. 223-242, pl. IX.

Indeed, it contrasts with the variation resulting in the division of the median ocellus, examples are also available to illustrate meristic variation of the same bilaterally symmetrical series fo structures in the direction of fusion, and even to the point of complete suppression.

Stannius[13] reported a worker honey bee specimen in which there is a complete fusion of the two compound eyes into a single symmetrical, elongate compound eye, that is uniformly continuous across the middle line. In this specimen there is also a reduction from the three ocelli which are typical for this insect, to a single ocellus located on the dorso-meson. Lucas[14] reported the similar fusion of the compound eyes in a honey bee of doubtful caste, accompanied by the complete suppression of the ocelli.

The median union of the ocelli could scarcely be interpreted as a reversion to an ancestral condition, and certainly the two opposite variations exhibited by these structures could not both be so interpreted. What may be the causes leading to either of these discontinuous changes we do not know; but it is not unlikely that variation in either direction may be found to result from the operation of the same factor or group of factors. At least it is better to refrain from drawing superficially plausible conclusions until we know more of the directive mechanism which molds the developing organism so uniformly true to type, and of the condition which now and then may cause the development of an individual in some detail to halt a little short of, to over-run, or otherwise to deviate from its due course.

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[13] Stannius, Mueller's Archiv. f. Anat. u. Physiol., 1835, P. 297. Pl.
[14] Lucas, H., Ann. Soc. Ent. France, 1868, ser. 4, v. VIII, p. 737, Pl.

It is truly an obligation, very generally neglected by American entomologists however, to record each example of insect teratology simply and directly, just as it is observed; but the fulfilment of this obligation is by no means accompanied by any additional obligation to offer at the same time an explanation or interpretation of the phenomenon. Indeed, in the present state of our knowledge of such phenomena any attempt to interpret individual examples is rarely demanded, or even scientifically justifiable.

THE SECOND ABDOMINAL PLEURITE IN THE HIGHER COLEOPTERA

By W. T. M. Forbes,

Cornell University, Ithaca, New York.

It is generally recognized that the first sternite of the abdomen is membranous in all the holometabolous insects. As to the first pleurite and the second segment there takes place a gradual reduction, which reaches such a stage that in the majority of Coleoptera the first two segments are represented by a more or less membranous dorsal and spiracular region only.

The usual statement is that the first segment of the abdomen has atrophied, and that the second is ventrally absent and laterally fused with the third. An examination of fresh specimens shows that this is not strictly the case. In fact the second pleurite may disappear in at least two different ways.

In the Bostrychiformia (Fig. 1, A) the first stage seems to have been an infolding of the whole subspiracular region of the first two segments, so that the hind coxa comes to lie against the anterior edge of the third segment or even overlap it somewhat. In this way the two segments are completely buried from view, and their sclerites become more or less completely de-chitinized, except on the mid-ventral line where the second segment takes the form of a strong keel, filling the space between the coxæ. The second pleurite is frequently completely membranous, but in the species figured (Trypopitys) it still shows some feeble chitinization and even a few rudimentary hairs

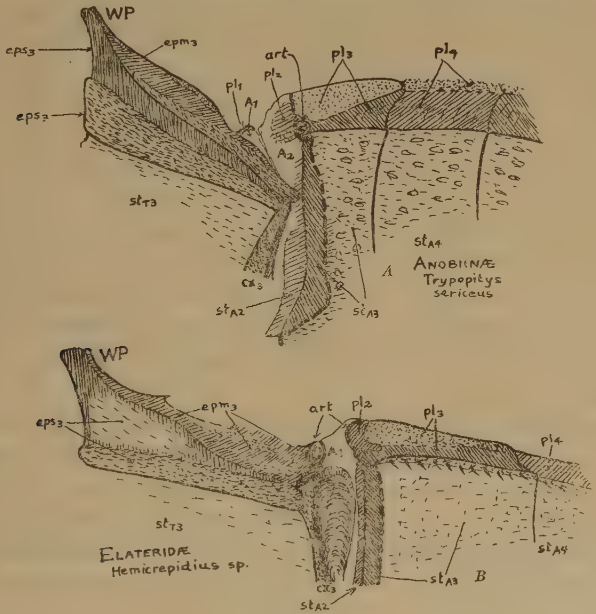

Fig. 1.

Each figure gives a ventro-lateral view of the junction of thorax and abdomen, with the articulation separated to expose the membranous structures. The variously shaded areas represent sclerites, the plain white, membrane. Hairy surfaces indicated, pads for the reception of the elytra stippled, the plain chitin striated.

A_1 Membranous first sternal region of abdomen. A_2 Membranous second sternal region of abdomen. eps_3 Metepisternum (the hairy ventral portion only is exposed when the elytra are closed). epm_3 Metepimeron (apex uncovered in Trypopitys, wholly covered in Hemicrepidius). pl_2, pl_3, pl_4 Pleurites of successive segments of abdomen. pl_1 rudimentary chitinous nodule, perhaps representing the first pleurite. st_{T3} Metasternum of thorax. st_{A2}, st_{A3}, st_{A4} Successive sterna of abodmen. art. Articular facets indicating the junction of metepimeron and second (or third) pleurite. WP Wing process. Heavy solid line. Edge of superficial portion of pleura, adjoining pleura of thorax in life. Heavy broken line. Edge of coxal cavity on surface of third sternite.

Fig. 1, *A*. Bostrychiformia, Anobiidæ. *Trypopitys sericeus*.
Fig. 2, *B*. Serricornia, Elateridæ. *Hemicrepidius* species.

(pl_2). The first visible pleurite in this case then is wholly formed of the third segment.

On the other hand an elater (Fig. 1, B) shows clear evidence of the fusion commonly assumed. The second pleurite is very small (pl_2), but lies completely flush with the surface of the body and forms the actual articular surface facing the metepimeron. The suture is traceable dorsally, and continuous with the well marked fold between the second and third dorsal segments, but it soon becomes ambiguous, and I am not sure I have indicated its course correctly.

The obvious conclusion from this is that the loss of the second pleurite has taken place twice independently (at least), and that its absence is not necessarily an indication of a homogeneous series of "higher Coleoptera." In fact the presence of forms with a well marked second pleurite is known in both series (Omethes, for instance in the Serricorns besides the possibly degenerate Lampyridæ; the early Dascyllidæ in the Bostrychiform series).

Incidentally it appeared in this work that the common statements as to the number of free segments of the abdomen are not correct. In the elater only the last segment is free, while in Trypopitys the entire abdomen is ankylosed, even the sutures being obliterated, except the first. This is correctly stated in the descriptions of the genus, but not allowed for in any key I have seen.

SOME UNUSUAL AND INTERESTING BUTTERFLIES FROM EASTERN MASSACHUSETTS.

By Austin H. Clark.

Smithsonian Institution, Washington, D. C.

During the months of July and August in 1923, 1924 and 1925 such time as could be spared from my regular duties was occupied in a study of the butterflies in eastern Massachusetts. The territory covered in 1923 extended from Needham to Waltham, Weston and Lincoln with headquarters at Newtonville. In 1924 and 1925 the region studied was from Manchester to Ipswich, especially Essex, with headquarters at Manchester.

On all of my excursions I was accompanied by my two sons, Austin B. J. Clark and Hugh U. Clark who are responsible for most of the captures recorded below.

In 1923 our efforts were mainly directed toward determining the status of *Feniseca tarquinius* in the region covered. We found it to be common, generally distributed, and readily secured in quantities after one has learned to recognize its characteristic haunts.

In 1924 and 1925 we concentrated our attention mainly on three localities in Essex which are natural butterfly traps. The first was an enormous patch of milkweed (*Asclepias syriaca*) by the roadside on Conomo street nearly opposite the farm house on Mr. S. D. Warren's estate. The next was a bog of considerable size wholly surrounded by wooded hills off the same street half a mile or so further on. Here numerous scattered examples of the red milkweed (*Asclepias incarnatum*) and later an abundant growth of *Cephalanthus* and subsequently patches of Joe Pye weed (*Eupatorium purpureum*) served as bait for the multitudes of argynnids and other butterflies that filtered in through the woods. The third was a dry hillside on the north side of Apple street near Bixby's camps sloping downward toward the west to a marshy spot protected from the wind by a fairly steep hill just beyond.

The summer of 1923 in eastern Massachusetts was noteworthy for the great abundance of *Satyrodes canthus* which in early July swarmed in all wet grassy places more or less protected by woodlands, and for the abundance of *Feniseca tarquinius* in correlation with the unusual abundance of its host (*Schizoneura tessellata.*)

The summer of 1924 was marked by the appearance of *Vanessa cardui* in great abundance and an increase in the numbers of *V. virginiensis*, together with an abrupt decrease in the numbers of nearly every other butterfly except *Anosia plexippus*, especially those types like *Argynnis*, *Brenthis*, *Satyrodes*, *Epidemia* and *Feniseca* which live in moist localities.

In 1925 *Vanessa cardui* was absent and *V. virginiensis* very scarce. In early July *Papilio glaucus* was unusually abundant, so numerous indeed that I counted more than twenty at one time about a single patch of milkweed in Essex. All the fritillaries were unusually abundant except *Speyeria idalia*, which was scarcely so numerous as in the preceding year, though still quite common. Hair-streaks and blues, as in 1923, were very common. A curious feature of the year was the great scarcity of *Anosia plexippus* which had been abundant in the two years preceding; not over half a dozen were seen in the course of the whole summer, and no larvæ were found.

Argynnis atlantis Edwards.

Essex: Bog off Conomo street, August 24, 1924, one female (A. H. C.); July 12, 1925, one female (A. B. J. C.); July 22, 1925, one male (A. H. C.); August 9, 1925, one female (A. H. C.). Milkweed patch on Conomo street, July 9, 1925, one reported (A. B. J. C.); July 10, 1925, remains of a female found on the ground (A. H. C.); August 9, 1925, one male (A. H. C.).

Apparently this butterfly is resident in this region. All the specimens seen were caught, though one was subsequently lost. It is easily distinguished from *A. cybele* and *A. aphrodite* both when on the wing and when resting. The preponderance of females among the captures was undoubtedly due to the lateness of the season.

Junonia coenia Hübner.

Essex: Marshy spot at the base of a dry hillside near Bixby's camps, Apple street, August 29, 1925, one (A. H. C.). Salt marsh at the junction of Apple street and the road to Essex Centre, August 30, 1925, one seen but not caught.

When resting this butterfly is very conspicuous but on the wing it is difficult to follow and is easily mistaken for a dragon-fly or grasshopper. It probably is a not uncommon casual in the extensive salt marshes and among the sand dunes of Essex county. In July 1898 I found it in numbers at Coffin's beach where apparently it had survived the winter.

Basilarchia arthemis (Drury).

Newtonville: Hillside west of Lowell avenue and south of Otis street, July 28, 1923, after a strong northerly gale, one (H. U. C.). This northern form is strikingly different from the usual, though not common, "white admiral" of this region.

Feniseca tarquinius (Grote).

Manchester: Tennis courts, Essex County club, July 21, 1925, one (A. H. C.). Alders along road over outlet of Gravel Pond, August 1925, larvæ (A. B. J. C.; H. U. C.).

Essex: Bog off Conomo street, August 30, 1925, one (A. B. J. C.). Main road from Manchester to Essex just beyond the Manchester line, fifteen larvæ, August 28, 1924; adult and eleven larvæ, September 1, 1925. Conomo road, on alders by a stream, August 1925, larvæ.

Newton Centre: Alders near stream east of Walnut street near Newtonville, August 1923, a few larvæ.

Newtonville: Woods south of Cabot street, two localities, abundant in both in 1923, apparently absent in 1924, a few in 1925. Hillside west of Lowell avenue and south of Otis street, abundant in 1923, absent in 1924 and 1925.

West Newton: Braeburn Club, near Pond, 1923.

Weston: west of the road to Lincoln, about alders, two localities, abundant in all stages, 1923.

Near the Lowell avenue locality in Newtonville larvæ were found on the carrion flower (*Smilax herbacea*) feeding on the large woolly aphid (*Neoprociphilus attenuatus*) that infests that plant. All of these larvæ were light pink in color and unmarked, but the butterflies reared from them were indistinguishable from those reared from larvæ found feeding on the woolly aphid of the alder (*Schizoneura tessellata*).

Two pupal skins from which the butterflies had emerged were found. One of these, at the Lowell avenue locality in Newtonville, was about four feet up on the main trunk of a large alder which had no aphids on its branches; the trunk was about three inches in diameter. The head of the pupa was directed downward. The other, from the locality in Essex near the Manchester line, was on the upper side of an alder leaf about a foot from the ground and directly beneath a large colony of aphids about six feet above it. The leaf was smeared with the exudations from the aphids to which cast skins and "wool" adhered. The pupa was in the inner half of the leaf and was attached to one of the veins near the midrib; its axis was paralle to the vein and its head was directed outward toward the margin of the leaf. In both these cases the larvæ had evidently dropped to the ground and thence crawled up to the supports on which they were found.

This is the easiest to rear of any of our butterflies, but reared adults are so very much more variable than those caught wild as to be practically useless for comparative purposes. Reared specimens in collections should be always labeled as such.

Chrysophanus thoë Boisduval

Essex: Marshy spot at the base of a dry hillside near Bixby's camps, Apple street, September 1, 1925, one female (A. B. J. C.).

Epidemia epixanthe (Boisduval and Le Conte)

Essex: Bog off Conomo street, common in a very small area in the southeastern portion, but scarcely ever seen beyond this area.

This species is common in all suitable localities in Waltham, Weston and Lincoln, but it is so inconspicuous that it frequently escapes observation.

Iphidicles ajax (Linné).

Brighton: one much broken specimen, June 1898 (Charles M. Bowers).

Laërtias philenor(Linné).

Manchester: Blossom Lane, August 17, 1925, one female (A. H. C.). This is not a common insect in this part of Essex county, though it appears from time to time.

Eurymus eurytheme (Boisduval).

Ipswich: About a mile east of the lighthouse, August 25, 1925, five seen, three males caught (A. B. J. C., 2; A. H. C., 1). All of these were fresh, though somewhat broken; apparently they had not come from any great distance.

Essex: Dry hillside near Bixby's camps, Apple street, August 30, 1925, one male.

Eurymus philodice (Godard).

Essex: Dry hillside near Bixby's camps, Apple street, August 30, 1925, one very pale, almost white, male (H. U. C.).

Eurema euterpe (Ménétries).

Manchester: Field west of Proctor street, September 4, 1924, two (A. B. J. C.). Blossom Lane, September 5, 1924, two (A. B. J. C.).

Essex: Bog off Conomo street, August 10, 1924, one fresh male (A. B. J. C.); July 30, 1925, one fresh male (A. B. J. C.).

Ipswich: about a quarter of a mile east of the lighthouse, August 25, 1925, one fresh female (A. H. C.).

This insect is probably less infrequent in Essex county than the records would seem to indicate as it is very easily confused with *Eurymus philodice*. In calm weather it is readily distinguished by its slower, feebler, lower, and more tortuous flight, but if there is any wind the differences tend to vanish. Although I am very familiar with this species I mistook the one captured at Ipswich for its larger and more powerful relative until it alighted on a beach pea immediately in front of me.

SOME RARITIES FROM ESSEX COUNTY, MASS.

By A. P. Morse.

Peabody Museum, Salem, Mass.

Several years ago I recorded (Psyche, vol. 28, p. 7,-1921) the capture of three examples of a dragonfly, *Sympetrum corruptum*, rare in Massachusetts, at Plum Island, Ipswich, Sept. 10, 1911.

On July 11, 1924, it was a common and conspicuous insect at a small pond in Marblehead, a dozen or more individuals being seen, of which four males and a female were secured.

Another rarity in eastern Massachusetts, the butterfly *Chrysophanus thoë*, believed to be the first example recorded from the county, was taken Sept. 6, 1924, at Salisbury, Mass.[1] This was a female in perfect condition, and was found on goldenrod flowers at the edge of the saltmarsh. A male also was seen but not secured.

[3] See this issue of Psyche, p. 296. [Editor.]

NEW SPECIES OF DIPTERA FROM NORTH CAROLINA AND FLORIDA

By Charles W. Johnson.

Boston Society of Natural History.

The following descriptions of the species from Florida have been taken from the manuscript of a supplementary list of the Diptera of Florida, which it seems undesirable to publish at present when so much still remains to be done on the insect fauna of that state.

Macrocera floridana sp. nov.

♂. Head yellow, ocelli black, antennæ brown, base yellow. Thorax yellow, with three broad shining brown stripes, the lateral ones shortened anteriorly. Abdomen yellow. Halteres and legs yellow, tarsi brown. Wings hyaline, slightly tinged with yellow, veins brown, a single brown spot is present at the bases of the submarginal and first and second posterior cells; only a small portion of the spot is in the first posterior cell, the slight brownish tinge at the tip of the wing is entirely due to minute hairs. Length 4 mm.

Two specimens. St. Augustine, Fla., April 16 and 17, 1919.

This species is related to *M. clara* Loew, but is separated by the absence of brown at the apex of the wing and at the stigma and the smaller clouding at the center of the wing.

Psilocephala subnotata sp. nov.

♂. Face and front black, entirely covered with a whitish pollen, in certain lights showing two dark spots above the base of the antennæ, eyes narrowly separated, about one third as wide below the ocelli as at the vertex, antennæ and proboscis black. Thorax blackish with light gray vittæ bordering a dark central stripe, pleura and scutellum black grayish pollinose, the latter with four black marginal bristles. Abdomen black with dense silvery white pollen and white hairs, the third and fourth segments only with shining black spots on the sides, the one on the third small while that on the fourth extends entirely across the segment; genitalia reddish with yellow and black hairs. Legs yellow, tips of the femora, tibiæ and tarsal joints brown. Halteres dark brown. Wings yellowish hyaline, veins and stigma light brown. Length 5 mm.

♀. Face and front entirely whitish pollinose, the latter above the antennæ about one third the width of the head and at the ocelli one sixth. Thorax as in the male. Abdomen shining black, with black hairs, posterior margins of the first, second, and third segments with a narrow border of silvery pollen and white hairs, fifth and sixth with a white pollinose spot on each side, tip of the abdomen dark brown with black hairs, otherwise like the male. Length 8 mm.

Two specimens, St. Augustine, Fla., April 12 and 18, 1919. Types in the author's collection.

Taken by the writer in company with *P. notata* Wied., with which it was at first confused. It is readily separated by its smaller size, the eyes not contiguous in the male, and the front entirely pollinose in both sexes.

Psilocephala davisi sp. nov.

♂. Face black whitish pollinose, hairs on the lower part of the face and inferior orbits white and much longer than in closely related species, front black whitish pollinose except the extreme upper and narrow part of the triangle which is shining black; first antennal joint black, the others dark brown. Thorax and scutellum black with long grayish hairs, dorsal stripes obsolete, the white hairs on the pleura long with dense tufts before the squamæ. Abdomen black, hairs white, forming dense tufts on the sides of the first and posterior margins of the second and third segments, the margins of which are also narrowly whitish pollinose, the shining spots on the sides of the second, third, and fourth segments conspicuous. Genitalia reddish with white hairs Femora black, hairs white, bristles black, tibiæ yellow, tips brown, base of the tarsi yellow, tips of the meta-tarsi and the remaining joints dark beown. Halteres black. Wings hyaline, veins near the base yellow, stigma and outer portion of the veins brown. Length 8 mm.

One specimen, Southport, N. C., April 10, 1914. Dedicated to its discoverer, Mr. William T. Davis.

The species might be confused with either *P. hæmorrhoidalis* Macq. or *P. frontalis* Cole. It is, however, more robust, with longer pile and narrower pollinose bands on the posterior margins of the abdominal segments. The shining black of the front is confined to the extreme upper point of the triangle.

Mixogaster delongi sp. nov.

♀. Head red, facial vitta brown, ocelligerous triangle black, front with a pair of longitudinal ridges on each side midway between the base of the antennæ and the orbits, antennæ red, the first and second joints together not quite as long as the third, the latter spatulate, about twice as wide near the tips as at the base, arista yellow, base black. Thorax: disc black with two narrow brown lines joined to a brown spot in front of the scutellum, lateral margins and a large spot on the pleura below the wings red, humeri, a small spot at the transverse suture, a large V-shaped mark on the pleura and the scutellum yellow, a spot in the the middle of pleura, the sternum and metanotum black. Abdomen, first segment yellow, second red, margined posteriorly with yellow, third and fourth brownish-black margined posteriorly with red and yellow. Genitalia reddish. Legs red, the basal half of all the tibiæ yellow. Halteres yellow. Wings brown, the costal and greater portion of the first and second basal and discal cells yellow. Length 11 mm.

One specimen, Paradise Key, Fla., April 6. Dedicated to Dr. D. M. DeLong, who collected this interesting species. A specimen has also been taken by Mr. H. C. Fall, Dunedin, Fla., Mar. 22, 1925.

Chaetopsis brooksi sp. nov.

♀. Head brown, the entire orbital margins whitish, ocellar triangle and sides of the vertex bluish, metallic, first and second joints of the antennæ yellow (third joint missing). Thorax bluish, shining, and slightly pruinose, an obscure dorsal stripe, pleura and scutellum brown; the pleura shows in certain light a bluish metallic lustre. Abdomen blackish, shining, base brown. Legs brown, the tibiæ and tarsi slightly darker than the femora. Halteres light yellow. Wings brownish, with a whitish hyaline spot, partly in the first and partly in the second posterior cells about halfway between posterior cross vein and the edge of the wing, a middle whitish band extends from the costa across the discal cell and into the third posterior cell but not quite reaching the posterior margin, base of the wing hyaline. Length 4 mm.

Two specimens collected by Mr. W. Sprague Brooks at Paradise Key, Fla., Feb. 25, 1920. The species is readily separated from the other American forms by its peculiar wing pattern, which resembles that of *C. angustata* Hendel from Brazil.

SOME MYRMECOPHILOUS PHORIDÆ FROM THE NEOTROPICAL REGION.[1]

By Charles T. Brues.

The several interesting flies described in the present paper have been sent to me through the kindness of Dr. Wm. M. Mann. During the course of his myrmecological excursions he never fails to obtain series of myrmecophilous insects and among these there are usually a few forms of wingless or subapterous Phoridæ. Those obtained by him recently in Mexico and Central America include several remarkable species taken in the nests of a number of ants, mainly with Eciton and Pheidole.

The types of the new species are deposited in the United States National Museum in Washington.

Ecitomyia Brues.

American Natural., vol. 35, p. 347 (1901)

Since I described this genus nearly twenty-five years ago, the type pecies, *E. wheeleri* remained its only representative until 1923 when Borgmeier added two species from Brazil. The name Ecitomyia was originally applied as the Texan *E. wheeleri* was found to be regularly associated with *Eciton cæcum.* Borgmeier's two species were, however, found associated with *Solenopsis sœvissima* var. *picea* and I now have a fourth species taken in Costa Rica with Pheidole.

It is evident therefore that the genus is by no means restricted to the driver ants although there can be no doubt that *E. wheeleri* is a true ecitophile and that it is restricted at least in Texas to association with *Eciton cæcum.* I have taken it many times and in considerable numbers, but never encountered it with any of the other species of Eciton that are common in that region.

Ecitomyia is closely similar to Ecitophora Schmitz and in error I once referred the type species to Ecitomyia (Psyche, vol.

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[1] Contribution from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 253.

30, p. 21, February 1923) although later in the same year I have correctly referred it to Ecitophora (Zoologica, New York, vol. 3, p. 439; (October 1923). As Schmitz has since pointed out on numerous occasions Ecitophora possesses well developed ocelli while these are entirely lacking in Ecitomyia.[1]

The Costa Rican species is most closely related to its northern congener, *E. wheeleri* Brues, but differs in chætotoxy and considering its different host relations must I think be regarded as a distinct species.

Ecitomyia manni sp. nov.

♀. Length 0.7-0.8 mm. Very similar to *E. wheeleri*. Eyes decidedly smaller in diameter than the third antennal joint. Post-antennal bristles large and strong, as long as the tennal joint; lateral bristles of the second and third row very weak, much smaller than the median ones. Lateral thoracic bristle nearly as long as the dorsum of thorax (.075 mm. as compared to .063 mm. in *E. wheeleri*). Wing as long as the dorsum, its bristles about 25μ in length (compared to 13μ in *E. wheeleri*). Second abdominal tergite not noticeably narrowed basally.

Type and two paratypes from Estrella Valley, Costa Rica (W. M. Mann). These were taken by Dr. Mann in April, 1924 in a nest of Pheidole.

[1] In his original description Schmitz speaks of the type of Ecitophora having been bleached in the preservative fluid and of the extreme difficulty in detecting the bristles of the front. In Psyche (l. c.) I have suggested that possibly Schmitz might have mistaken the insertions of bristles for the ocelli. This remark was certainly not intended as any criticism of this author's uniformly painstaking work on these extremely small insects. The writer appreciates only too well the difficulties of studying them when imperfectly preserved or when injured before or after preservation or even when the mounting does not allow one to turn the specimen into the proper position to determine minute characters. On finding finely preserved specimens agreeing almost exactly with Schmitz's description of *Ecitophora comes*, but without ocelli, I naturally supposed that the ocelli described were really the points where bristles had been inserted. Father Schmitz has however assured me that the condition of the type allows *three* ocelli to be distinguished. I wish therefore to make an apology for my seemingly very hasty remark which as indicated above was in no way intended to suggest any carelessness on the part of a most accurate observer. Further work also attests the accuracy of Schmitz's first observation as additional specimens of *E. comes* have since been collected and other species discovered.

As indicated this species differs from *E. wheeleri* by the much longer lateral thoracic bristle and wing bristles and in the form of the second abdominal tergite.

In addition to the above I have another most remarkable species which is referred provisionally at least to Ecitomyia. It certainly cannot be placed in any other genus so far described and differs also very conspicuously from the other very closey allied species of this genus in possessing a number of enormously enlarged bristles on the abdomen. These form transverse rows at each side of the tergites which are formed as in Ecitomyia as are also the head, thorax and wings. As I suspect that intermediate forms may be discovered it does not seem wise to make this the type of a new monotypic genus.

Ecitomyia spinosa sp. nov. (Fig. 1)

♀. Length 1.5-1.7 mm. Head, thorax and abdominal plates and spots yellowish brown; abdomen pale yellowish white; legs brownish yellow; antennæ pale yellow; wings dark, almost black except at base. Head somewhat more than twice as broad as long, the anterior margin of the front rounded, more sharply so at the middle. Mouthparts very small, retracted within the oral cavity which is sharply carinate anteriorly. Eyes small, oval, about one-fourth as long as the head-height; ocelli entirely absent. Antennæ ovate, quite distinctly contracted at the apex; arista long, strongly pubescent, as long as the head-height. Four strong proclinate antennal bristles medially at the anterior margin of the front, the upper pair longer and set further apart; middle frontal row represented only by one lateral bristle near the eye; upper row of four about equally spaced. Thorax oval, twice as wide as long, with a strong bristle at each side and four across the disk; also a pair of smaller ones near the middle behind and another toward the side between the lateral pair of the transverse row. Wings reduced to small band-shaped pads as long as the dorsum of the thorax; the upper surface is convex, the tip more or less pointed and the surface strongly bristly, some of the bristles almost as long as the wing. Abdomen broadly ovate, the four apical segments forming a tube of rather narrow diameter which is distinctly turned upwards in fully developed specimens; one stenogastric individual has the abdomen much smaller. Dorsal plates of the second to fifth segment present; the second large, with four strong bristles along the hind margin; the others much smaller, each with a pair of bristles

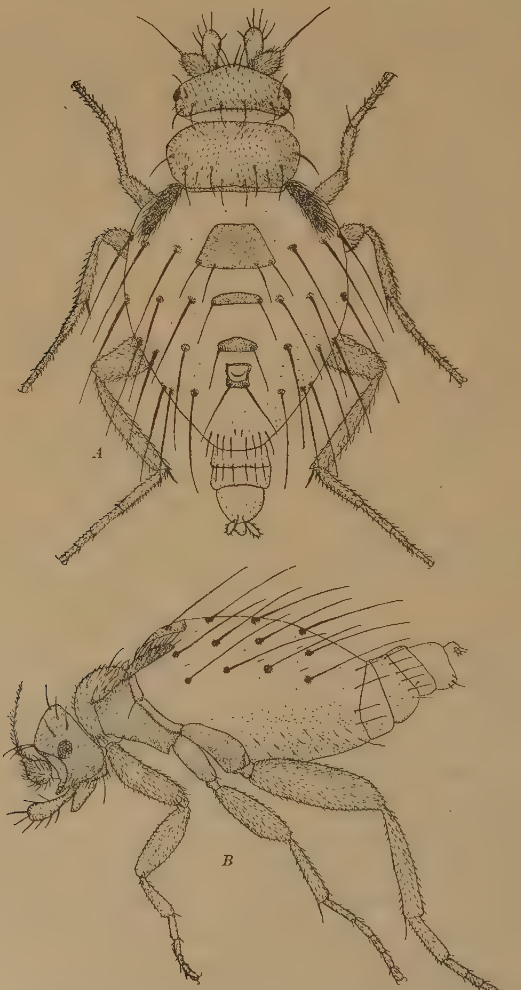

Fig. 1. *Ecitomyia spinosa* sp. nov., female. A, dorsal view; B, ventral view.

placed behind close to the lateral angles. Fifth segment with a gland opening which lies within a quadrangular chitinous rim that arises from the front margin of the fifth plate. Abdomen bearing twenty-four greatly enlarged marcochætæ, each about as long as the hind tibia. These are arranged in four transverse rows, three bristles at each side of each abdominal plate. Where each is inserted to the pale abdominal membrane there is a small rounded dark brown spot. These stout, intensely black bristles are very conspicuous and together with the blackish wing pads give the insect a most extraordinary appearance. Legs rather long and not very stout; the hind femora rather noticeably compressed.

Type and three paratypes from Huascato, Jalisco, Mexico (W. M. Mann). These were taken in a nest of Pheidole sp. Another specimen from San Diego de Cocula, Jalisco, Mexico (W. M. Mann) was taken with Eciton.

The small wings are unusually dark and heavily chitinized, but are evidently very weakly attached to the body as one specimen has lost both wings and two others had only one wing remaining attached when I received them.

Ecitophora costaricensis sp. nov.

♂. Length with abdomen well extruded 1.6 mm.; without tubular apex of abdomen, 1.3 mm. Length of wing 0.30 mm.; of dorsum of thorax 0.24. Front with 14 bristles comprising four strong post-antennal ones of which the upper ones are twice as far apart as the lower, four in the lower frontal row disposed as a pair close to each eye with the outer bristle well above the inner one, six in an upper row close to the vertex with the lateral bristle near the eye margin. Head covered with coarse, well separated hairs, very conspicuous on the sides below the eyes; cheek with a strong downwardly directed bristle. Palpi rather slender, each with six strong bristles. Eye elongate oval, longer than the third antennal joint, but only about two-thirds as wide; ocelli present, well developed. Third joint of antenna subovate, as long as broad; arista distinctly longer than the head-height. Thorax above with eight bristles, one at each anterior angle, one lateral one just behind the middle and four forming a dorsal line behind the middle with its lateral bristle quite close to the one in front of it; in addition there are two shorter bristles near the median line close to the posterior margin which are undoubtedly homologous to the scutellar bristles although there is no trace of a scutellum. Wing narrow, strap-shaped, strongly bent near the middle, its outer edge clothed with fine bristly hairs at the base and small bristles apically, and in addition with a series of five longer bristles each about half as long as the wing. Abdomen with the second tergite chitinized, one-third longer than wide, the base four-fifths as broad as the apex; anterior angles rounded, posterior ones sharply angulate; with the usual hairs and row of minute apical bristles. Third tergite absent; fourth very small, crescentic, with four marginal bristles; fifth a minute band with a circular ring behind enclosing the gland opening, with two minute bristles at tip. Posterior margin of second to fifth segments with a row of minute bristles; sixth segment bristly medially and at tip. Legs rather stout, the hind metatarsi unusually stout.

Type from Hamburg, Farm, Sen Jose, Costa Rica (F. Nevermann) taken with Eciton sp.

This species agrees closely with the previously described species. From *E. parva* Schm. it may be distinguished by the complete absence of the third tergite and longer wing bristles; from *E. bruchi* Schm. by the presence of 14 frontal bristles; from *E. comes* Schm. by the presence of eight dorsal thoracic bristles and a greater number of wing bristles; and from *E. collegiana* Borgm. and *E. æqualis* Borgm. also by the eight thoracic bristles. Heretofore no species of this genus have been reported outside of the South American continent.

Ecituncula Schmitz

Tijdschr. v. Entom., vol. 66, p. LXXIX (1923)
Schmitz, Pub. No. 4, Mus. Nat. Rio de Janeiro, p. 26 (1924).

A species probably referable to this genus was taken by Dr. Mann in the nest of Pheidole in Mexico. It differs greaty from the type and only described species of Ecituncula in having the abdomen beset with a large number of bristly hairs arranged in transverse rows. It differs also in having a lateral pair of well developed frontal bristles in addition to those present in the type species and also has the full number of mesonotal bristles.

There are no wings in either of the two specimens, but as the wings of some of these forms are very readily deciduous, it is impossible to be positive that wings may not have been present. In the species described on an earlier page as *Ecitomyia spinosa* some specimens had lost either one or both wings. As the attachment of the veistigial wing, in this form at least, appears to be very feeble and as microscopical examination does not readily disclose any indication of a rupture of the cuticle, I cannot feel perfectly satisfied on this point.

Ecituncula setosa sp. nov. (Fig. 2).

♀. Length 1.0-1.3 mm., dependent upon the stenogastric or physogastric condition. Head, metathorax and basal abdominal plate dark brownish; antennæ and legs pale testaceous; abdominal membrane pale yellowish white. Head, seen from above, more than twice as wide as long; rounded at the sides and sharply rounded medially in front. Eyes small, about half the diameter of the antenna, with contiguous facets. Four postantennal bristles near the anterior margin of the front, the upper pair farther apart than the lower one; middle frontal row consisting of four long bristles forming a pair rather close to each eye, the inner one of each pair much higher than the lateral one; ocellar row of four, the median ones nearer to each other than to the adjacent lateral one. Ocelli absent. Palpi of the usual form, with about five strong bristles along the margin. Antennæ oval, slightly acute apically, very densely pubescent; arista very short and thick, composed of three very distinct segments. Mesothorax about twice as broad as long, the sides rounded, slightly angulate just in front of the middle; with a large stout bristle close to each lateral angle and a transverse series of six across the middle of the disc. No trace of wings, although there is a small impression at each posterior angle of the mesothorax at the point where strap-shaped wings are attached in forms where these are present. Metathorax forming a narrow band lying in a basal emargination of the abdomen. Abdomen in the fully developed physogastric form ovate, at least twice as broad as the head and thorax, widest near the middle of the second segment; dorsum with only one chitinized plate, that of the second segment and a chitinized ring surrounding the gland opening of the fifth segment; the second plate is about as long as broad at apex which is one-half broader than the base. Abdomen very bristly, the bristles arranged in about eight transverse rows very clearly aligned except near the narrow apex of the abdomen; the bristles are longer and stouter at the side of each row and the lateral bristle is in each case much the largest. Legs rather short and stout, with the usual minute bristling.

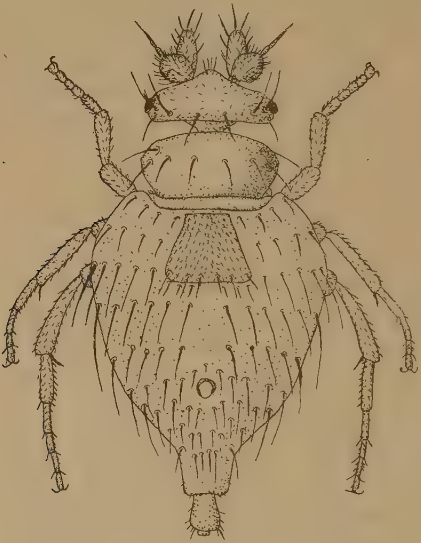

Fig 2. *Ecituncula setosa* sp. nov., female.

Type and one paratype from San Diego Cocula, Jalisco, Mexico, with Pheidole sp. (W. M. Mann).

Puliciphora myrmecophila sp. nov. (Fig. 3).

♀. Length 1.0 mm. Head and thorax brownish yellow, darker above; dorsal abdominal plates piceous, the abdominal membrane yellowish white; antennæ, palpi and legs pale brownish yellow. Four strong postantennal bristles, the upper pair nearly twice as far apart as the lower; other frontal bristles very weak except the two in the upper row between the ocelli which are long and stout; the lateral bristle of this row and the one within the eye-margin very small and scarcely differentiated from the frontal hairs which are unusually large. Three stout bristles below each eye above the oral margin. Proboscis stout, oval, nearly as long as the head height. Third joint of antennæ rounded, the arista rather strongly pubescent, one-fourth longer than the head height. Eye as large as the antenna; composed of about twenty-five facets. Thorax slightly wider than long, with a transverse series of six bristles behind, the median pair close to the hind margin and farther apart than their distance from the adjacent ones which are placed farther forward; lateral bristle placed at the posterior third of the mesonotum. Abdomen with six dorsal plates; first unusually long, the lengths of the plates 25:45:29:25:16:8. There is no distinct slit in the fifth segment for the opening of the gland but a transverse crescentic or almost semicircular clear area indicates its position. That this area represents the fifth segment is evident from the furcula (apodeme) of the sixth segment which extends forwards at this point (see fig. 3) although there is no segmentation of the sides of the abdomen to mark off the fifth segment. Sixth and also a small

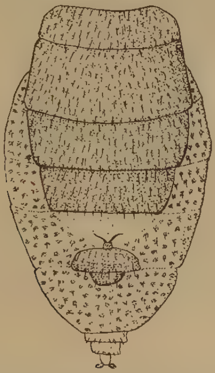

Fig. 3. *Puliciphora myrmecophila*, female, dorsal view of abdomen.

seventh tergite present. Legs rather slender, the four posterior tibiæ each with a single small apical spur; hind metatarsus with six transverse rows of bristles. The abdominal membrane is covered with conspicuous dark chitinized specks, each bearing a minute bristle; these extend also over the entire venter but are absent on the sides except on the last two segments.

Type and one paratype from Ototonilco, Jalisco, Mexico (W. M. Mann), taken in a nest of a species of Pheidole.

The absence of a distinct fifth tergite and the well developed sixth and seventh tergites seem to distinguish this form from any others described although to judge from his figure, it is possible that *P. pusillima* de Meijere may have a similar conformation of the abdominal plates. De Meijere indicates however only five tergites with a space between the fourth and fifth. In my specimens of the present form the apodemes described by Schmitz as arising from the sixth segment are very clearly to be seen arising from the anterior margin of the penultimate tergite. Under a very high power (oil-immersion) it is seen that they are attached to a small median plate more or less separate from the one I have called the sixth, but I think the larger part must be the sixth and not a seventh tergite.

Chonocephalus jamaicensis Brues.

There is a single female of a species of Chonocephalus from Costa Rica bearing the label "with *Coptotermes niger* Snyder (Coll. F. Nevermann). After a very careful examination, I cannot distinguish it from *C. jamaicensis* Brues[1]. In Jamaica, at least, this species is not associated with either ants or termites and such seems usually to be the case with members of this genus although Borgmeier[2] has described *C. ecitophilus* taken with Eciton in Brazil. I am therefore satisfied that the association of the present specimens with termites is accidental.

[1] Psyche, vol. 22, p. 102; 1915.

[2] Deutsch. Ver. Wiss. u. Kunst. São Paulo, Jahrg. 3, p. 145; 1923.

A JAPANESE DOHRNIPHORA BRED FROM DEAD SNAILS (DIPTERA: PHORIDÆ)

By Charles T. Brues.

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Several species of the genus Dohrniphora in various parts of the world regularly develop in the bodies of dead insects and molluscs. These forms are apparently never parasitic as their eggs are not deposited until after the death of the host.

In 1914 Schmitz described[1] an African species, *D. bequærti* which was obtained in East Africa by Dr. Joseph Bequaert who found it developing in the body of a decaying snail. Schmitz believes however that the species is probably not restricted to a shell-fish diet as he states later (1919, Biolog. Centralbl., vol. 37, p. 40) that larvæ of the same form have been observed in soured milk.

Prof. T. D. A. Cockerell has just sent me a male and female of a species of Dohrniphora which I cannot distinguish from *D. bequærti* on the basis of Schmitz's description. These are from Hongo, Wakasa, Japan and were bred by Mr. T. Okano from the bodies of dead snails of the genus Euhadra. Whether the Japanese examples are really cospecific with the African form mentioned above is perhaps doubtful, but such species are readily spread by commerce and such a wide distribution would be by no means surprising.

NOTES ON THE ANT FAUNA OF OAK GALLS IN THE WOODS HOLE REGION.

By A. H. Sturtevant.

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During August and September, 1925, several hundred "oak apples" (galls of *Cynips* (*Amphibolips*) *confluens* Harris or a similar species) were examined from the region near Woods Hole, Massachusetts. These galls were in all cases picked up from the ground under oak trees. Though only a small proportion were inhabited by ants, fourteen colonies of six forms of ants were found, including one that has not hitherto been recorded from New England. There follows a list of the species found.

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[1] Jaarb. Natuurh. Genootsch. Limburg, p. 105.

1. *Myrmica punctiventris* Roger. Woods Hole, five colonies. Workers, queens, males, eggs, larvæ, and pupæ. The four queens found were all dealated; three of these were in one colony, that also contained nineteen males and one male pupa.

Identified by Prof. W. M. Wheeler who has also verified the identification of number 4 below.

2. *Leptothorax curvispinosus* Mayr. Falmouth, one colony. One deälated queen, over 100 workers, numerous eggs and larvæ, a few pupæ.

3. *Leptothorax curvispinosus ambiguus* Emery. Falmouth, one colony. Workers, a few eggs, larvæ, and pupæ. This gall was under the same tree as that containing the colony of the typical form of the species.

4. *Harpagoxenus americanus* Emery. Tarpaulin Cove, Naushon Island, August 30; one colony. One deälated queen, nine workers; 152 workers of *Leptothorax curvispinosus*, several eggs, 21 larvæ, 5 pupæ. The pupæ appear to be Leptothorax, and several of the Leptothorax workers are evidently callows. The species is recorded from the District of Columbia; Beatty, Pennsylvania; Bronxville, New York. *L. curvispinosus* is its usual host (see Wheeler, 1910. Ants, p. 494).

5. *Tapinoma sessile* Say. Cotuit, Pocasset, Falmouth, Naushon Island; five colonies. Workers, deälated queens, eggs, larvæ, pupæ. One of the colonies contained fifteen deälated queens.

6. *Lasius niger*, var. *americanus* Emery. Woods Hole, one colony. Workers, pupæ. A populous colony (104 workers, 12 pupæ), but no eggs, larvæ, or sexual forms were found.

THE RELATIVE IMPORTANCE OF VISION AND THE CHEMICAL SENSE IN ANAX LARVÆ.

CYRIL E. ABBOTT.

University of Wisconsin, Madison, Wis.

General observations and experimental work on the larvæ of *Anax junius* for over a year, seemed to indicate that the responses of these insects are chiefly dependent on the sense of sight. Thus taking of food, in particular, seems to be the result of reactions to form and movement. General observation also indicated that the chemical sense was correspondingly weak. Although the question of image-formation in insects has been treated by Cole (1907), Demoll (1910), Forel (1908), and Seitz (1912); and the chemical sense by numerous authorities, including Forel (1908), Kafka (1918), and Lubbock (1888); apparently no work has been done with dragon-fly larvæ. Accordingly, two experiments were made; one to test the reactions of the larvæ to form, the other to determine whether or not they would react to the chemical emanations from distant objects. Each experiment is a check on the other, and both are related to prehension.

Reaction to Form.

Individual.		Positive responses	Negative responses
1.	Food:	15	0
	Triangle:	4	7
2.	Food:	9	7
	Triangle:	1	12
3.	Food:	11	2
	Triangle:	0	9
4.	Food:	10	0
	Triangle:	4	15
5.	Food:	9	5
	Triangle:	1	11
6.	Food:	8	5
	Triangle:	0	13
7.	Food:	13	2
	Triangle:	0	16
8.	Food:	10	0
	Triangle:	1	15
9.	Food:	9	7
	Triangle:	0	12
10.	Food:	11	4
	Triangle:	0	8

Chemical Sense.

In ten of the twelve tests a broth made from meal-worms was used. In the remaining trials pyridine was substituted for the broth.

Individual	Positive response	Negative response	No response
1.	5	0	6
2.	0	4	8
3.	1	1	10
4.	1	3	8
5.	4	4	4
6.	0	0	12
7.	0	0	12
8.	0	0	12
9.	3	1	8

Discussion.

The larvæ were numbered and a record kept of their behavior. Almost daily, but not always at the same hour, each insect was fed a bit of meal-worm (*Tenebrio molitor*) about three cubic mms. in volume. Every day the insects were stirred with a paper triangle on the end of a needle. The triangle had an area of about one square cm. It was at first presumed, because of the results of experiments indicating that these animals have some degree of memory, that learning would simplify the experiment; but in this case the larvæ gave no evidence of associating either a pleasant sensation with the food or an unpleasant one with the triangles. Probably any tendency to form associations was inhibited by the complexities of the experiment.

The above experiment is open to the objection that some chemical sense may have influenced the behavior of the larvæ. Nine insects were tested by introducing into the water near them a broth made from meal-worms. This was introduced at all possible distances from, and all possible angles to, the insects. Some larvæ moved their mandibles when surrounded by a dense cloud of the suspension; most of them seemed totally unaware of the presence of the liquid. This broth was a visible suspension, which probably accounts for the fact that larvæ 1 and 9 extended their labia when it was introduced. They gave no response when their eyes were covered with asphaltum.

Both normal insects and those with covered eyes gave no response to pyridine. This is interesting, because many aquatic insects have a strong aversion to even a minute quantity of the substance. Psephenus larvæ, whose intense thigmotropism is undisturbed by the presence of formaldehyde or alkalies, will release their hold and make violent efforts to escape the instant pyridine is present in their habitat. Dytiscid larvæ behave in a similar way.

Although Anax larvæ gave no indication of ability to sense the chemical nature of distant objects, it is quite evident that they have a sense of taste. Unpleasant substances are quickly rejected, and the animals move their mandibles for some time subsequently.

CONCLUSION.

Anax larvæ distinguish small edible objects from larger triangular figures. Thus they distinguish the size, and probably the form, of objects.

The larvæ are incapable of sensing the chemical nature of a distant object. While antennal pits are present, they are few and scattered; experiment indicates that the chemical sense of these animals is located in the mouth.

The perception of form and movement through vision is the chief means utilized by these larvæ for obtaining food.

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MANTISPA INTERRUPTA AND M. BRUNNEA IN NEW ENGLAND.

In 1913 (Psyche Vol. 20 p. 170) the writer recorded a specimen of *M. interrupta* Say, from Lake Boone, Stowe, Mass. This year the collection of the Boston Society of Natural History has been enriched by two additional specimens. The first was taken by Mr. Henry A. MacDonald at Lake Cochituate, Natick, Mass., July 3, 1925, and the second by Mr. E. J. French, at Nutting's Pond, Billerica, Mass., July 6, 1925. All three specimens were taken on window screens.

In 1913 there was but one specimen of *M. brunnea* Say (Walpole, Mass.) in the Society's collection. Now there are the following additional specimens --Hampton, N. H., June 30, 1918 (S. A. Shaw), Milton, N. H. Aug. 20, 1923 (A. F. Magrew), Centerville, Mass., July 15 (C. J. Maynard) and Canton, Mass. June 25, 1919 (D. H. Linder).

C. W. JOHNSON

On July 13, 1925 Professor Ulric Dahlgren captured at Salisbury Cove, Mt. Desert, Me. a specimen of the white-banded day-sphinx, *Aellopos titans* Cram. It is considered by some authors to be a variety of *A. tantalus* Linn. This is probably the most northern record for this southern species. There is also in the collection of the Boston Society of Natural History a specimen of this moth, taken at Cohasset, Mass., a number of years ago.

C. W. JOHNSON.

PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

The annual meeting was held January 13, 1925. The secretary's report showed a slight increase in the attendance at meetings, the average being 15 members and 2.6 guests. Eight members have been elected, one resigned, and two died, leaving a total membership of 78, an increase of 5 over last year. The editor's report showed that volume 31 of Psyche, just completed, contains 325 pages, a substantial increase over the preceding volume. The following officers were elected: President, J. H. Emerton; Vice President, C. W. Johnson; Secretary, J. Bequaert; Treasurer, Fred H. Walker; Editor, C. T. Brues. Executive Committee: W. M. Wheeler, O. E. Plath, S. S. Crossman.

Prof. C. T. Brues, retiring President, read an address on Predatism among Insects.

Mr. S. M. Dohanian told of his experiences in Spain, during his work on the Gipsy Moth and its parasites.

At the meeting of February 10, 1925, the following amendment to the by-laws was adopted: "Any member may become a life member on the payment of fifty dollars in one sum to the treasurer of the Club, and only the income of funds thus received shall be applied to the current funds of the Club.

"Persons having performed signal services for the Club may be elected honorary life members and shall not be subject to dues."

Mr. C. W. Johnson presented some notes from the Washington Meeting of the Entomological Society of America.

Dr. J. Bequaert spoke of Some African Social Wasps and their Parasites.

At the meeting of March 10, 1925, Mr. O. E. Plath read a paper on the Natural Grouping of the Bremidæ (Bombidæ), with special reference to biological criteria.

Dr. J. Bequaert exhibited a collection of wasps of the genus *Ancistrocerus* and commented upon their habits and classification.

At the meeting of April 14, 1925, Mr. J. H. Emerton spoke of the Ornaments of the Male Spiders of the Genus *Pellenes*.

Mr. C. W. Johnson discussed the North American Varieties of *Volucella bombylans* Linn. See vol. 32, No. 2.

Prof. C. T. Brues exhibited a number of American species of *Peripatus*. See vol. 32, No. 3.

At the meeting of May 12, 1925, Mr. H. Morrison read a paper entitled: "Notes upon Scale Insects or Coccidæ."

At the meeting of June 9, 1925, Mr. O. E. Plath presented a paper on the Rôle of Bumblebees in the Pollination of Several Cultivated Plants.

Dr. J. Bequaert spoke of work he had done with Mr. O. E. Plath on the taxonomy of certain North American *Psithyrus*.

Mr. L. W. Swett discussed the characters presented by the male genitalia in the Geometridæ.

PSYCHE

INDEX TO VOL. XXXII. 1925.

INDEX TO AUTHORS.

Abbott, C. E. The Relative Importance of Vision and the Chemical Sense in Anax Larvæ, 315.
Andrews, E. A. Growth of Ant Mounds, 75.
Bequaert, J. New Nemestrinidæ (Diptera) from Rhodesia and New Guinea, 4.
Bequaert, J. Notes on Hippobos cidæ, 266.
Barber, G. W. The Efficiency of Birds in Destroying Over-Wintering Larvæ of the European Corn Borer in New England, 30.
Bowditch, F. C. Notes on Galerucinæ in My Collection, 244.
Bromely, S. W. The Bremus Resembling Mallophoræ of the Southeastern United States, 190.
Brues, C. T. Some Species of the Genus Leucospis, 23.
Brues, C. T. Notes on Neotropical Onycophora, 159.
Brues, C. T. Some Myrmecophilous Phoridæ from the Neotropical Region, 303.
Brues, C. T. A Japanese Dohrniphora Bred from Dead Snails (Diptera: Phoridæ), 313.
Bruner, S. C. See Metcalf, Z. P.
Clark, A. H. Some Unusual and Interesting Butterflies from Eastern Massachusetts, 293.
Cockerell, T. D. A. The Fossil Fly Eophlebomyia, 229.
Crampton, G. C. The External Anatomy of the Head and Abdomen of the Roach, *Periplaneta americana*, 195.
Forbes, Wm. T. M. Pectinate Antennæ in the Geometridæ, 106.
Forbes, Wm. T. M. The Second Abdominal Pleurite in the Higher Coleoptera, 291.
Glasgow, R. D. A Specimen of *Melanoplus differentialis* Thomas with Four Ocelli, 285.
Hood, J. D. New Neotropical Thysanoptera Collected by C. B. Williams, 48.
Howe, R. H. Jr., Another Instance of the Northward Migration of Odonata in the Spring, 113.
Hungerford, H. B. Notes on the Giant Water Bugs, 88.
Johnson, C. W. A New Species of the Genus Gaurax, 47.
Johnson, C. W. The North American Varieties of *Volucella bombylans* Linn., 114.
Johnson, C. W. New Species of Diptera from North Carolina and Florida, 299.

Johnson, C. W. *Mantispa interrupta* and *M. brunnea* in New England, 318.
Mann, W. M. Guests of *Eciton hamatum* (Fab.) collected by Professor W. M. Wheeler, 166.
Metcalf, Z. P. and S. C. Bruner, Notes and Descriptions of the Cercopidæ of Cuba, 95.
Mjöberg, Eric. The Mystery of the so-called "Triolobite Larvæ" definitely Solved, 119.
Mjöberg, Eric. A New Genus of Suckling Lice, 283.
Morse, A. P. Some Rarities from Essex County, Mass., 298.
Parker, G. H. The Weight of Vegetation Transported by Tropical Fungus Ants, 227.
Rau, Phil. A Note on the Moulting of the Tarantula *Eurypelma hentzii*, 1.
Robertson, Charles. Note on Panurgidæ (Bees), 113.
Robertson, Charles. Habits of the Hibiscus Bee, *Emphor bombiformis*, 278.
Sturtevant, A. H. Notes on the Ant Fauna of Oak Galls in the Woods Hole Region, 313.
Schwartz, R. L. Some Hitherto Undescribed Habits of *Meskea dyspteraria* Grote, 70.
Van Duzee, M. C. New Species of North American Dolichopodidæ, 178.
Weiss, H. B. Insect Food Habit Ratios on Qulepart Island, 92.
Weiss, H. B. and Erdman West. The Insects and Plants of a Strip of New Jersey Coast, 231.
West, Erdman. See Weiss, H. B.

INDEX TO SUBJECTS.

All new genera, new species and new names are printed in Small Capital Letters

Abdominal pleurite of Coleoptera, 291
Abutilon, gall on, 70
ADRANEOTHRIPS ABDOMINALIS, 55
ADRANEOTHRIPS, 54
ADRANEOTHRIPS ALTERNATUS, 55
ADRANEOTHRIPS BELLUS, z54
ADRANEOTHRIPS FUSCICOLLIS, 56
ADRANEOTHRIPS SIMULATOR, 54
ADRANEOTHRIPS TIBIALIS, 54
ADRANEOTHRIPS UNIFORMIS, 56
Aellopos tantalus, 318
Aellopos titans, 318
Amphibolips confluens, 313
ANAPHOTHRIPS BICINCTUS, 50
Anax, junius, vision and chemical sense in larvæ, 315
Ant fauna of oak galls, 313
Ant mounds, growth, 75
Ants, tropical, weight of vegetation transported by, 227
Antennæ of Geometridæ, 106
Argynnis aphrodite, 294
Argynnis atlantis, 294
Argynnis cybelle, 294
ASTROTHRIPS ANGULATUS, 50
ASTHROTHRIPS CONSTRICTUS, 51
Atta columbica, 227

BARYTHRIPS HETEROCERUS, 66
Barythrips sculpticauda, 67
Basilarchia arthemis, 295
Benacus griseus, 88
Birds feeding on European corn borer, 30
BRADYTHRIPS
BRADYTHRIPS HESPERUS, 68
Bremus, mimics of, 190
Bremus pennsylvanicus, 190
Bulla of wing membrane, 17
Butterflies from Massachusetts, 293

Cambridge Entomological Club, proceedings, 319
Cecidia, 70
CERATIA DENTICORNIS, 246
CERATIA DOHERTYI, 247
Ceratia fovata, 247
Ceratia jacobyi, 246
Ceratia martia, 246
Cercopidæ from Cuba, 95
Chonocephalus ecitophilus, 312
Chonocephalus jamaicensis, 312
CHAETOPSIS ANGUSTATA, 302
CHAETOPSIS BROOKSI, 301
Chemical sense in Anax larvæ, 315
Chickadee, feeding on European corn borer, 30
Chrysophanus thoë, 296, 298
CHTHONEIS AENEIPENNIS, 263
Chthoneis albicollis, 259
Chthoneis apicalis, 259
Chthoneis apicipennis, 259
CHTHONEIS BOLIVIENSIS, 262
Chthoneis dilaticornis, 260
CHTHONEIS DONCHIERI, 263
Chthoneis foveicollis, 261
Chthoneis furcatus, 260
CHTHONEIS GROSSA, 260
Chthoneis jamsoni, 260
CHTHONEIS MARGINIPENNIS, 260
CHTHONEIS ROSENBERGI, 262
CHTHONEIS RUFULUM, 262
CHTHONEIS STUARTI, 261
CLASTOPTERA CUBA, 105
CLASTOPTERA FLAVIDORSA, 104
Clastoptera stolida, 95, 104
Clastoptera undulata, 95, 103
Coleoptera, second abdominal pleurite of, 291
Coptotermes niger, 312
Copulatory tuft of Meskea, 70
COREMOTHRIPS, 52
COREMOTHRIPS PALLIDUS, 52
Corn borer, European, destroyed by birds, 30

Criocerus binotata, 253
Criocerus borneensis, 253
Criocerus dromedarius, 253
Criocerus impressa, 253
Criocerus laosensis, 253
Criocerus latefasciata, 253
Criocerus malaccana, 253
Criocerus rougeri, 253
Criocerus seminigra, 253
Criocerus unipunctata, 253
CRYTOTHRIPS ACUTICORNNIS, 65
Cryptothrips carus, 64
CRYPTOTHRIPS CONNATICORNIS, 65
CYYPTOTHRIPS GRADATUS, 64
Cryptothrips junctus, 66
Cuba, Cercopidæ from, 95
Cynips confluens, 313

Dasyllis thoracica, 190
Dasyoptera, 102
Dasyoptera variegata, 102
Diabrotica cyaneomaculata, 255
Dihammatus, 130
Dihammatus abditus, 137
Diptera, new from Flordia and North Carolina, 299
Dohrniphora bequaerti, 313
Dolichopus appendiculatus, 184
DOLICHOPUS MACULITARSIS, 184
Downy woodpecker feeding on European corn borer, 30
Drilidæ, development, 145
Drilus flavescens, development, 146
Dryobates pubescens, feeding on European corn borer, 30
DULITICOLA, 133
DULITICOLA PARADOXA, 134

Ecitomyia, 303
ECITOMYIA MANNI, 304
ECITOMYIA SPINOSA, 305, 309
Ecitomyia wheeleri, 303
Eciton cæcum, 303
Eciton hamatum, guests of, 166
Ecitophiles, 166, 303
citophora, 304
Ecitophora æqualis, 308
Ecitophora bruchi, 308
Ecitophora collegiana, 308
Ecitophora comes, 308
Ecitophora parva, 308
ECITOPHORA COSTARICENSIS, 307
Ecituncula, 308
ECITUNCULA SETOSA, 308
Emphor bombiformis, habits, 278
ENOCOMIA MAESTRALIS, 101
Entomological Congress, international 117
Eocene, fossil fly of, 229
Eophlebomyia, 229
EOPHLEBOMYIIDAE, 230
Epidemia expixanthe, 297
Epiperipatus biolleyi, var. *betheli*, 165
Epiperipatus brasiliensis, 162
Epiperipatus edwardsii, 161
Epiperipatus imthurmi, 162, 164
Epiperipatus isthmicola, 164
Euhadra, Phorid bred from, 313
Eurema enterpe, 298
European corn borer, winter mortality, 30
Eurymus eurytheme, 297
Eurymus philodice, 297
Eurypelma hentzii, moulting of, 1
EURYTHRIPS COLLARIS, 58
EURYTHRIPS GRACILICORNIS
Euxenister asperatus, 174
Euxenister caroli, 176
EUXENISTER WHEELERI, 176
Exora basale, 255
Exora bellum, 258
Exora buchleyi, 257
EXORA CYANEOMACULATUM, 255
EXORA GUTTATUM, 256
EXORA MACULATUM, 259
EXORA OCTOGUTTATUM, 258
EXORA QUADRIPUSTULATUM, 256
EXORA ROSENBERGI, 257
EXORA SIMILE, 258

Feniseca tarquinius, 295
Feronia, 270

Food habits of insects, 92

Formica exsectoides, growth of mounds, 75

FRANKLINIELLA NIGRICANDA, 50

FRANKLINIELLA PARVULA, 49

Galls of Lepidoptera, 70

GAURAX DORRI

Geometridæ, antennæ, 106

Glossina, 230

Growth of ant mounds, 75

Gymnopternus, 186

GYMNOPTERNUS CONVERGENS, 187

GYMNOPTERNUS FLAVITARSIS, 187

Gymnopternus flavus, 188

GYMNOPTERNUS MACULIVENTRIS, 188

GYMNOPTERNUS ROBUSTUS, 189

HAMOPHTHIRIUS, 283

HAMOPHTHIRIUS GALEOPITHECI, 283

HAPLOSONYX FRENBI, 245

HAPLOSONYX HUMERALIS, 245

HAPLOSONYX MELANOCEPHALUM, 246

HAPLOSONYX MONTICOLA, 245

Haplothrips bellus, 54

Haplothrips tibialis, 54

Harpagoxenus americanus, 314

Hemicrepidius, 291

HERCOSTOMUS PURPURATUS, 185

Hercostomus, 186

Hercostomus flavicornis, 187

Hercostomus metatarsalis, 187

Hercostomus ornatus, 187

Hercostomus unicolor, 187

Hercostomus vetius, 187

Hibiscus bee, 278

HINDSIANA RHOPALOCERA, 57

Hippoboscidæ, notes on, 265

Homalisus frontes, 149

Hoplosoma quadripustulatum, 246

HYDROPHORUS CRIDDLEI, 181

HYDROPHORUS FULVIDORSUM, 182

Hydrophorus intentus, 183

Hypermetamorphosis, 150

Insects of New Jersey Coast, 231

International Entomological Congress, 117

Iphidicles ajax, 297

Junonia cœnia, 295

Lærtias philenor, 297

Lampyridæ, larvæ, 119

Lampyridæ, wingless female, 119

Lampyris noctiluca, 122

Lasius niger americanus, 314

Latrodectes mactans, web of, 3

Leocomia, 97

LEOCOMIA BALLONI, 98

LEOCOMIA FULVA, 100

LEOCOMIA GRISEA, 97

LEOCOMIA MAESTRALIA, 99

LEOCOMIA NAGUA, 98

Leocomia pileæ, 100

Lepidopterous galls, 70

LEPTONIA HOSPES, 167

LEPTONIA PICTA, 168

Leptothorax curvispinosus, 314

Leptothorax curvispinosus ambiguus, 314

Lepyronia angulifera, 95

LEPYRONIA ROBUSTA, 103

Lethocerus americanus, 88

Leucospis affinis, 29

Leucospis bicincta, 29

LEUCOSPIS BIRKMANI, 23

Leucospis cayennensis, 25

Leucospis distinguenda, 25

Leucospis japonica, 28, 29

Leucospis macrodon, 28

LEUCOSPIS MALABARENSIS, 27

LEUCOSPIS MUIRI, 25

Leucospis mysolica, 27

Leucospis quettaensis, 28

Leucospis viridissima, 28

LISSOTHRIPS BREVICEPS, 59

Lissothrips pallipes, 60

Luminosity of lampyrid larvæ, 132

LUPERODES BRUCHII, 251

LUPERODES CYANEOPLAGIATA, 252

Luperodes flaviollis, 253
LUPERODES FLAVIPENNIS, 249
LUPERODES HEBARDI, 249
LUPERODES KLAGESI, 252
LUPERODES MACULICOLLIS, 252
LUPERODES MAPIRII, 248
LUPERODES PILOSUS, 249
LUPERODES PUSTULATUS, 248
LUPERODES SUTURALIS, 250
Luperodes rubra, 253
Luperodes rufescens, 253
LUPERODES VITTATUS, 251
LUPERODES WEISEI, 253
Luperodes javanensis, 253
Luperus fucatus, 260
LUPERUS BENIENSIS, 254
LUPERUS BLUMENENSIS, 254
LUPERUS MASONI, 253
LUPERUS PALLIDUS, 254
Lycidæ, development, 145
Lycostomus gestroi, 129
Lynchia simillima, 275
Lynchia, 266
Lynchia penelopes, 265, 270
Lynchia pusilla, 275
Lyropæus biguttatus, 123

Macrocera clara, 299
MACROCERA FLORIDANA, 299
Macroperipatus geayi, 161
MACROPHTHALMOTHRIPS WILLIAMSI, 63
MALACOSOMA BASALE, 255
MALACOSOMA BELLUM, 258
MALACOSOMA BUCKLEYI, 257
MALACOSOMA CYANEOMACULATUM, 255
MALACOSOMA GUTTATUM, 256
MALACOSOMA MACULATUM, 259
MALACOSOMA OCTOGUTTATUM, 258
MALACOSOMA QUADRIPUSTULATUM, 256
MALACOSOMA ROSENBERGI, 257
MALACOSOMA SIMILE, 258
Malformations in insects, 288
Mallophora bomboides, 191
MALLOPHORA CHRYSOMELA, 191, 193
Mallophora fautrix, 193
Mallophora fulva, 190
Mallophora nigra, 191
Mallophora orcina, 190, 191
MALLOPHORA REX, 191, 192
Malvaviscus, gall on, 70
Mantispa brunnea, 318
Mantispa interrupta, 318
Massachusetts, butterflies from, 293
Medeterus emarginatus, 180
Medeterus minimus, 180
Melanophus differentialis, 285
MEROTHRIPS COGNATUS, 53
Merothrips fusciceps, 53
Merothrips williamsi, 54
Meskea dyspteraria, habits, 70
MESORHAGA PALLIDICORNIS, 178
Microlynchia falcinelli, 275
Microlynchia pusilla, 275
Migration of Odonata, 113
MIXOGASTER DELONGI
Monecphora bicinta, 95
Monecphora fraterna, 95
MONECPHORA FLAVIFASCIA, 96
Monecphora ignipecta, 96
Monecphora saccharina, 96
Monolepta flavicollis, 253
Monolepta rubra, 253
Moulting of tarantula, 1
Myrmecophiles, 166, 303
Myrmica punctiventris, 314

Nemestrinidæ, new, 4
Neoteinic females of Lampyridæ, 128
Neotropical Onycophora, 159
NEUROGONIA MINIMA, 179
Neurogonia nigricornis, 179
Neurothrips magnofemoralis, 63
NEUROTHRIPS WILLIAMSI, 63
New Jersey, insects and plants of coast, 231
New York State list of insects, 118
Nycterimyia capensis, 18
Nycterimyia dohrni, 18
Nycterimyia fenestra-clathrata, 18
Nycterimyia fenestra-ornata, 18
Nycterimyia horni, 18
Nycterimyia kerteszi, 18

Nyctenimyia papuana, 18
Nygmata of wing membrane, 17

Oak galls, ants from, 313
Ocelli, supernumerary, 285
Odonata, migration, 113
OIDES NIASENSIS, 244
Olfersia, 270
Olfersia exornata, 273
Olfersia falcinelli, 275
Olfersia garzettæ
Olfersia lividicolor, 265, 272, 274, 276
Olfersia maura, 265, 271, 273
Olfersia rubipes, 275
Olfersia spinifera, 275
Onycophora, Neotropical, 159
Ornithomyia brunnea, 271
Ornithoponus, 270
Ornithoponus obliquinerivs, 271
Ornithoponus rufiventris, 271
Oroperipatus corradoi, 159
Oroperipatus eiseni, 159

Panurgidæ, notes on, 113
Paraclius flavicornis, 187
Paraclius ornatus, 187
Pectinate antennæ of geometridæ, 106
Penthestes atricapillus feeding on European corn borer, 30
Perdita obscurata, 113
Peripatus betheli, 165
Peripatus biolleyi, 165
Peripatus brasiliensis, 162
PERIPATUS BRASILIENSIS, VAR. VAGANS
Peripatus danicus, 161
Peripatus dominicæ, 162
Peripatus edwardsii, 161, 164
Peripatus geayi, 160
Peripatus imthurmi, 164
Peripatus isthmicola, 164
Peripatus torquatus, 160
Periplaneta americana, external anatomy of, 195
"Perty's" larvæ, 119
Phengodes 122, 147
Phoridæ, myrmecophilous, 303
Phosphænus, 145
Phyllobrotica ornata, 246
Plants of New Jersey Coast, 231
PLESIOTHRIPS AMBLYCAUDA, 53
PLECTOTHRIPS IMPATIENS, 61
PLESOTHRIPS OCTARTHRUS, 52
Pristothrips, 61
PRISTOTHRIPS AAPTUS, 62
PRISTOTHRIPS ALBIPUNCTATUS, 62
PROSOECA BECHERI, 7
PROSOECA RHODESIENSIS, 4
Prothetely, 150
PSEUDOLYNCHIA, 271
Pseudolynchia brunnea 271, 276
Pseudolynchia capensis, 272
Pseudolynchia exornata, 273
Pseudolynchia garzettæ, 273
Pseudolynchia lividicolor, 274
Pseudolynchia maura, 273, 276
Pseudolynchia rufipes, 275
Pseudolynchia simillima, 275
PSILOCEPHALA DAVISI, 300
Psilocephala frontalis, 301
Psiocphala hæmorrhoidalis, 301
Psilocephala notata, 300
PSILOCEPHALA SUBNOTATA, 299
PULICIPHORA MYRMECOPHILA, 310
Puliciphora pusillima, 312
PYGOTHRIPS CONIFER, 67
Pygothrips metulicauda, 67
PYGOTHRIPS NIGRICAUDA, 67
Pyrausta nubilialis, 30

Ratio of food habits, 92
Roach, external anatomy of, 195

SCELOLYPENUS ROSENBERGI, 264
SCELOLYPENUS TENUIMARGINATA, 264
Schizoneura tessellata, 296
Scelothrips, 52
Solenopsis sævissima picea, 303
Snail, Phorid bred from, 313
STENOBASIPTERON ARNOLDI, 8
STENOBASIPTERON DIFFICILE, 10
Stenobasipteron gracile, 14
Stenobasipteron, key to species, 17

Stephanothrips occidentalis, 69
Stomatothrips septenarius, 48
Supernumerary ocelli, 285
Sympetrum corruptum, 298
Synodites bifurcatus, 170
Synodites schmidti, 171

Tapinomma sessile, 314
Tarantula, moulting of, 1
Telephoridæ, development, 145
Tenthredella simirubra, 287
Teratological specimen of Melanoplus, 285
Tetradonia, 170
Thysanoptera, new neotropical, 48
Tomaspis fraterna, 95
Triaplatys denticornis, 246
Triaplatys jacobyi, 246
Triaplatys martia, 246
Triaplatys dohertyi, 247
Triaplatys foveata, 247
Trichophilopterus, 284
Trichothrips calcaratus, 57
Trichothrips flavicauda, 58
"Trilobite" larvæ, 119
Tripopitys sericeus, 291
Troglosternus dasypus, 173
Troglosternus ecitonis, 172
Tylois barberi, 176
Tylois mirificus, 177
Tylois trilunatus, 177

Urothrips, 68

Volucella bombylans, varieties, 114
Volucella americana, 116
Volucella arctica, 116
Volucella evecta, 114, 116
Volucella facialis, 114
Volucella lateralis, 115
Volucella plumata, 114
Volucella rufomaculata, 115
Volucella sanguinea, 116
Vanessa cardui, 294
Vanessa virginiensis, 294
Vision in Anax larvæ, 315

Water bugs, notes on 88
Williamsiella
Williamsiella bicoloripes, 60

Xenocephalus clypeatus, 166
Xenocephalus panamensis, 166

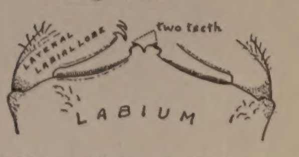
Zaperdita maura, 113
Zygothrips speciosus, 56
Zyras ecitonis, 169
Zyras mimulus, 170

PICTORIAL KEY TO THE LARVAE

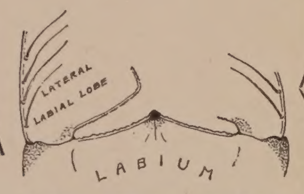
(LIBELLULIDAE AND CORDULEGASTERINAE)

LIBELLULIDAE (including also CORDULEGASTERINAE)

CORDULEGASTERINAE. Ambush or Hiding Larvae

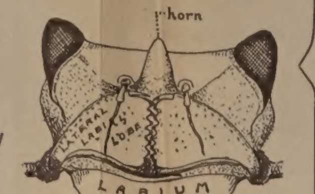


Labium with two teeth at apex (see Cordulegaster)



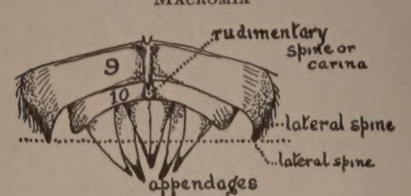
Labium *without* two teeth at apex

MACROMIINI. Sprawling Larvae



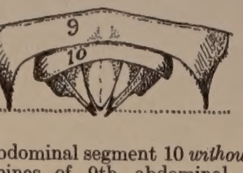
Head *with prominent* pyramidal frontal horn (see MACROMIINI).

MACROMIA

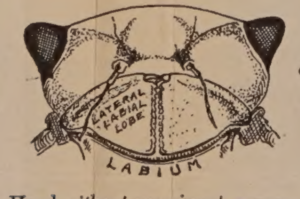


Dorsum of abdominal segment 10 *with* carina or rudimentary hook. Lateral spines of 9th abdominal segment *not* reaching to apex of appendages

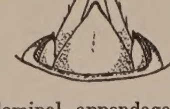
DIDYMOPS



Dorsum of abdominal segment 10 *without* carina. Lateral spines of 9th abdominal segment reaching *nearly* to apex of appendages.

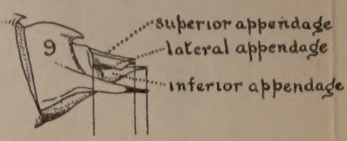


Head *without* prominent pyramidal frontal horn.

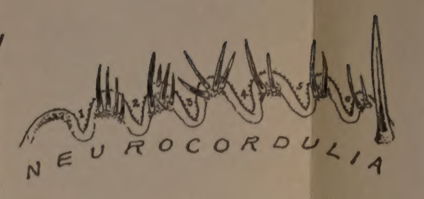


Superior abdominal appendage *tapering symmetrically* to a point.

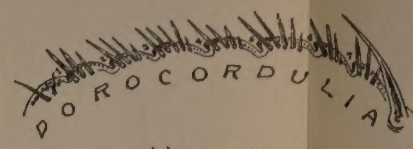
CORDULIINAE. Sprawling Larvae

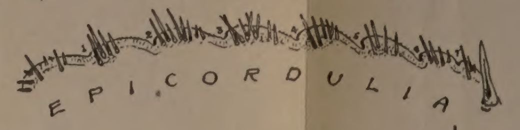


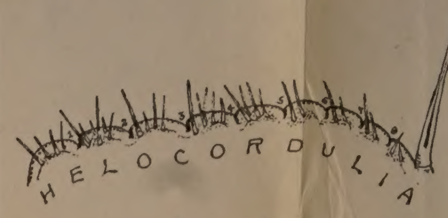
Lateral abdominal appendages are generally *more* than half as long as the inferior appendages

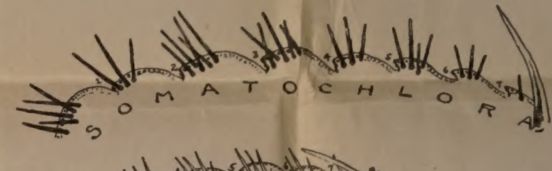


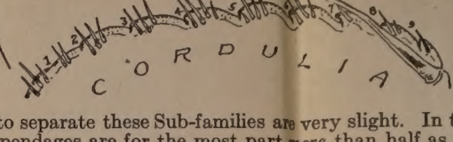
WILLIAMSONIA (unknown)





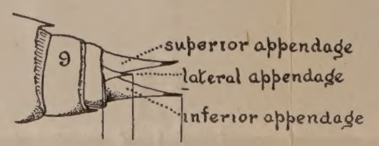




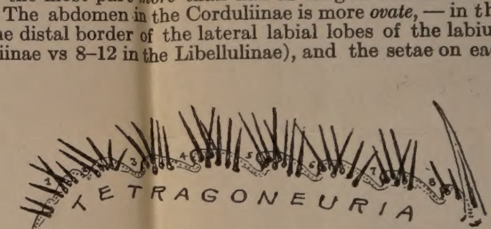


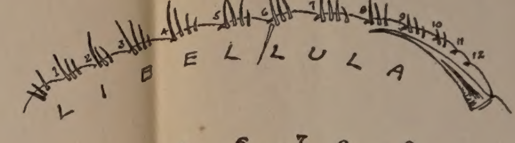
NOTE: As in the imagoes the characters to separate these Sub-families are very slight. In the larvae no one character holds. The lateral abdominal appendages are for the most part *more* than half as long as the inferior in the Corduliinae — *less* than half in the Libellulinae. The abdomen in the Corduliinae is more *ovate*, — in the Libellulinae more *lanceolate*. The crenulations along the distal border of the lateral labial lobes of the labium are deeper, and fewer in number (6–8 in the Corduliinae vs 8–12 in the Libellulinae), and the setae on each tooth more numerous (4–5 vs 1–4).

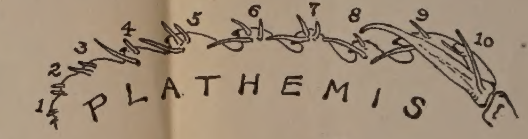
LIBELLULINAE

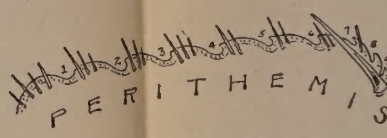


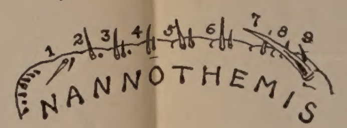
Lateral abdominal appendages are generally *less* than half as long as the inferior appendages

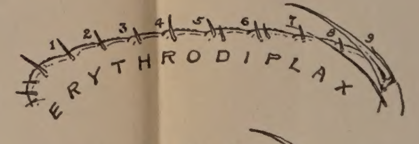


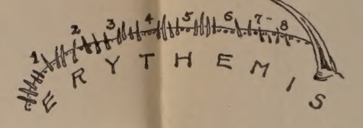


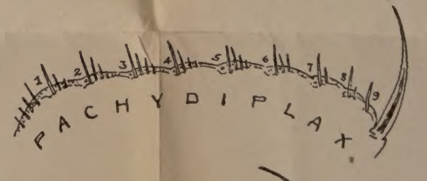


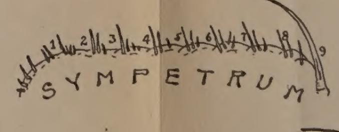


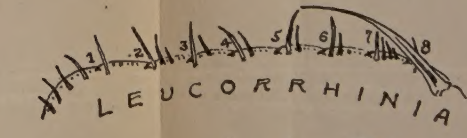


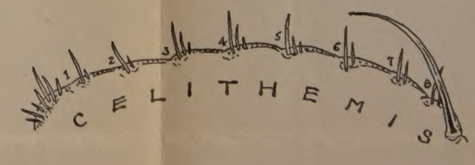


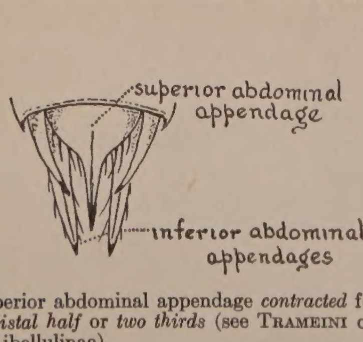




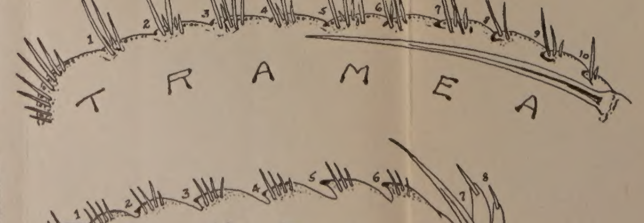


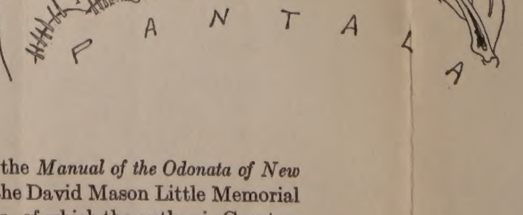






Superior abdominal appendage *contracted* for its *distal half* or *two thirds* (see TRAMEINI of the Libellulinae)





This chart will be included also in Part III of the Larvae in the *Manual of the Odonata of New England*, by R. Heber Howe, which will appear as Memoir I of the David Mason Little Memorial Museum of Natural History, Belmont Hill School, Belmont, Mass., of which the author is Curator. The former parts of this Manual were published as Memoir II of the Thoreau Museum of Natural History, Middlesex School, Concord, Mass., of which the author was formerly Curator.

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